Documentation in a Medical Setting with Young and Older Adults

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Documentation in a Medical Setting with Young and Older Adults

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To women in academia, especially those striving for success in the sciences.

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LIST OF ABBREVIATIONS

QoC	Quality of Care
OA	Older Adult
YA	Young Adult
TECH	QoC subscale of Technical Quality
GSAT	QoC subscale of General Satisfaction
INTER	QoC subscale of Interpersonal Aspects
COMM	QoC subscale of Communication
TIME	QoC subscale of Time spent with patient
FAMIL	QoC subscale of Familiarity with technology
TIME	QoC subscale of Time spent with patient
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SUMMARY

The presence of a device meant to enhance the medical encounter may alter the nature of the doctor-patient interaction in a way that affects patient satisfaction. The focus of this study was to examine the social impact of introducing advanced exam-room technologies to the doctor-patient interaction. By comparing cohorts (young: 18-39 and older: 62-89) we examined a possible age-related interaction. Participants viewed one of several video conditions portraying a physician conducting a medical interview in which he uses one of various documenting technologies (*Nothing*, *Pen and Paper*, *PDA*, *Desktop Computer*, *Wearable Computer*). After viewing the interaction, participants completed a series of questionnaires evaluating their general satisfaction with the quality of care (QoC) given during the medical interview. Patient satisfaction levels did significantly vary depending on the technology condition, participant cohort, and participant gender. Overall, young adults and females rated the doctor more favorably. The favorability of ratings for each technology condition depended on the aspect of QoC examined.

CHAPTER 1

INTRODUCTION

The role of the medical practitioner has shifted in the last few decades. While once dominated by an autocratic style, the medical field has become more patient-centered. Given the level of emphasis that has been placed on assuring patient satisfaction in many aspects of the medical experience (i.e., communication, technical quality, interpersonal skills), it seems peculiar that the effects of the technological devices that have become an increasingly ubiquitous presence in the exam room have been largely unstudied. While the affordances of advanced technology are diverse, their impact on social interactions is not well studied. The doctor-patient interaction is the naturally occurring, exhaustively examined encounter that is the focus of this study. In addition to being a fairly steady dynamic across individual health care systems, there exist defined and tested measures of the doctor-patient interaction.

The quality of care (QoC) perceived by a patient during the medical encounter has implications for patient recovery and health maintenance. Patients who believe they have received poor QoC are less likely to adhere to doctor recommendations (Ong et al., 1995). A major influence on perceived QoC is the communication, both verbal and non-verbal, between the doctor and patient (Roter & Hall, 1989; Ong et al.). The medical interview is the portion of the interaction when the doctor assesses the patient's symptoms and concerns. During the medical interview, a doctor must take note of the patient's comments while continuing to listen and prompt the patient with more probing questions.

Physicians have several options as to which note-taking medium to use. Traditionally, pen and paper have been used to jot down notes during the course of the examination. Alternatively, the doctor may have chosen to make mental notes during the examination and to document these after exam completion. Advanced technology now available can potentially be utilized as a powerful tool in the exam room; allowing the physician to seamlessly access patient history, up-to-date medical information, and possible diagnoses all while conversing with the patient. Technology use in the exam room is not, however, without drawbacks. The presence of a device meant to enhance the medical encounter will alter the nature of both verbal and non-verbal components of the interaction due to physical manipulation of the device itself as well as changes in the type and speed of information available. A majority of communication occurs non-verbally and these physical aspects of communication are of increased import to those with sensory impairments, commonly found in older patients. Understanding how patients will react (through measurable changes in perceived QoC) to exam room technology and, more specifically, to resultant changes in the doctor-patient interaction is key in understanding how to counter any negative consequences. The benefits of assistive technologies cannot fully be realized until patient barriers to technology adoption are addressed. These barriers may be particularly pronounced in the older adult population.

Previous research on the effects of exam room technology is limited and, further, the influence of age is, as of yet, unexamined. An age-related comparison is important for several reasons. First, getting patients to comply with doctor recommendations is crucial, especially for older adults who suffer from proportionately more serious illnesses and who typically have longer recovery periods (Teresi, Ramirez,, Ocepek-Welikson, &

Cook, 2005). Second, it is likely that older adults will not show the same patterns as younger adults for exam room technology acceptance given existing age differences in general technology acceptance (Czaja, Charness, Fisk, Rogers, & Sharit, 2001). Third, age-related physiological decrements hinder communication, which may exaggerate technology induced challenges to doctor-patient interaction (Robinson, White, & Houchins, 2006).

CHAPTER 2

DOCTOR-PATIENT INTERACTIONS

Arguably, the interaction between doctor and patient during the medical consultation is the most critical point for transferring information and the delivery of excellent healthcare (Roter & Hall, 1989; Bertakis, Roter, & Putnam, 1991; Ong, de Haes, Hoos, & Lammes, 1995; Russuvuori, 2001). During the medical interview, the physician's primary task is to become familiar with patient history while eliciting symptoms in a way that is meaningful. A secondary, but nearly as important, task is for the physician to connect with the patient (Ong et al.). Patient perception of this connection is reflected in judgments of the doctor's "bedside manner". The doctor-patient interaction is the patient's most salient feature on which to judge the quality of care they receive.

There are at least two aspects to healthcare quality: actual patient outcome (observable consequences due to a medical encounter); and perceived QoC (the patient's personal judgment of the healthcare quality). Actual patient outcome can be measured in several ways including: adherence to doctor recommendations, recall of information given during consultation, and understanding of diagnosis (Ong et al., 1995). Perceived QoC is a good predictor of actual patient outcome (Ong et al.). The most widely accepted assessment of perceived QoC, and the measure that is considered in this study, is 'patient satisfaction'. Of all patient measures, patient satisfaction has been found to have the most consistent relationship to physician behavior - as opposed to patient demographic variables such as anxiety, illness, and pain (Roter & Hall, 1989). Patient satisfaction will

be operationalized in subsequent sections (see Methods section). Ong and collegues report that patients evaluate their overall healthcare experience on their doctor's interpersonal skills; skills which are interpreted through both verbal and (largely) non-verbal communication.

Verbal Versus Non-verbal Communication

The primary tool by which information is transferred between doctor and patient is interpersonal communication (Roter & Hall, 1989; Ong et al., 1995). Verbal communication consists not only of the spoken word, but also of verbal inflection, pauses in speech, and tone. Non-verbal communication has been operationalized as body positioning, posture, gaze, etc. These non-verbal components, or visual cues, make up approximately 80% of perceived interpersonal communication (Ong et al., 1995). Gorawara-Bhat, Cook, and Sachs (2007) further divide non-verbal components of communication into those that are static (i.e., layout of the furniture in the room), those that are dynamic (i.e., interaction distance, vertical height difference, physical barriers, and angle of interaction), and kinesic (i.e., stance, eye contact, facial expression, gesture, and touch). The introduction of exam room technology will change both verbal and non-verbal aspects of communication. For example, the presence of a device can constrain the physical layout of the room, eye contact, hand gestures, pauses in speech, speaker-to-listener orientation, and so on.

Previous research has shown that patients often believe that their physician is not listening to them when attention is shifted from the patient to the records; resulting in loss of eye contact (Ruusuvuori, 2001). For an anxious patient, such as one with a potentially life threatening condition, the need to know the physician is engaged in the conversation

is heightened (Ong et al., 1995). Commonly, tactics are employed by speakers to regain eye contact with an intended recipient whose gaze has wandered. One such tactic is achieved by pausing mid-sentence, or engaging in other speech discontinuities until the recipient's gaze is regained (Goodwin, 1981). This verbal tactic has been observed during medical interviews, indicating that the patient is perturbed by the loss of their physician's gaze (Ruusuvuori).

CHAPTER 3

EXAM ROOM NOTE TAKING

Note taking affords a crucial written record without which the doctor might tend to overlook problems presented subsequent to the beginning of the medical interview (Ruusuvuori, 2001). The method used by the doctor to take notes will constrain the layout of the exam room and the physician's physical posture. Physical posture constrains both eye contact and body orientation of the doctor to the patient (Gorawara-Bhat, Cook, & Sachs, 2007).

Eye contact is broken when the physician shifts attention from the patient to refer to medical charts (output) or to record notes (input). Even when eye contact is maintained, the speaker's torso may or may not be facing the recipient depending on the arrangement of the workspace. The physician's torso may be squarely framing the patient (0º body orientation) or the physician's torso may be oriented away from the patient (90º body orientation). In the second case, the physician must turn his or her head to face the patient (see Figure 1). Evidence has shown that people prefer the 0º body orientation to the 90º when speaking to someone (Ruusuvuori, 2001; Furnham, Petrides, & Temple, 2006; Ong et al., 1995).

A recent emphasis on patient-centered medical care has created a need for questions about patient preferences to be answered. Though a shift in the medical field from its once autocratic style has led to many patient-centered solutions, few studies have addresses the social impact of the implementation of advanced technology to the medical

interview. The goal of this study was to compare the reactions to multiple exam room technologies along the lines of patient satisfaction.

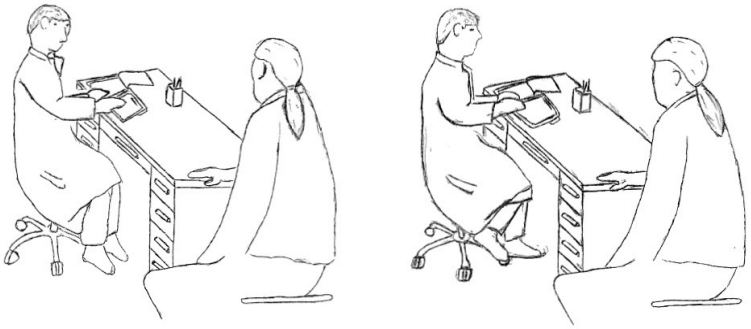


Figure 1. The 0 and 90-Degree Conditions for Physician to Patient Body Orientation.

CHAPTER 4

NEEDS OF YOUNG VERSUS OLDER PATIENTS

The quality of care literature shows a recognition that the needs, perceptions, and behaviors of patients differ by age group, or cohort (Teresi, Ramirez, Ocepek-Welikson, & Cook, 2005). Aging adults make more frequent doctor visits (an average of eight per year) and require significantly more time during an examination than their younger counterparts (Robinson, White, & Houchins, 2006). Patients over the age of 65 are a rapidly increasing proportion of the healthcare consumer population. As such, the demand on already taxed physician resources - namely time - will continue to increase. Many studies have shown that electronic medical recording can lead to increased documentation, decreased time of visit, and improved patient care over paper charts (Wu & Straus, 2006).

Although the older adult population could arguably benefit the most from the implementation of time-saving technology in the exam room, older patients may tend to be the least trusting of such devices and may be the most likely to perceive artificial barriers between themselves and their healthcare provider (Czaja et al., 2006; Zeman, Johnson, Arfken, Smith, & Opoku, 2006). Czaja and colleagues have found that compared to younger cohorts, older adults are less likely to adopt, typically have greater challenges learning to operate, and may not appreciate the full beneficial capabilities of technology. Further, they suggest that, "general knowledge about technology and the role of technology in task performance is important to technology adoption." (p. 348).

Alternatively, because older adults do schedule more frequent doctor visits and often have more serious concerns than young adults, they may indeed be more receptive to the latest medical developments. In fact, although there have been a few inconsistent reports, the overwhelming majority of studies have shown a reliable, positive relationship between age and reported patient satisfaction across methodologies. That is, ratings of health care providers tend to increase with patient age (Hall & Dornan, 1990; Cohen, 1996; Larson, 1999; Rahmqvist, 2001). Further, age is by far the strongest correlate of patient satisfaction over other demographic variables such as class, gender, education, etc.

Cohen (1996, p. 1090) offered some explanations for the positive age by patient satisfaction correlation that resonate with suggestions made by like contemporaries such as lowered expectations with age, actual increase in respect and health care quality delivered to older adults versus young adults, or that older adults have memories of inferior health care options in the past. Hall and Dornan (1990) posited that older adults are generally more accepting and less willing to pass negative judgments on health care providers, as well as in general. Recognizing the need to tailor health care delivery to participants based on age, Teresi and colleagues (2005) developed the Assessment of Doctor-Elderly Patient Transactions (ADEPT), an instrument intended to operationalize findings from doctor-patient interaction analysis; the first tool to explicitly assess doctor-elderly patient interactions.

The current study aims to augment the growing body of literature on doctor-patient interactions with patient age as a primary factor. Specifically, by elucidating whether the older adult tendency to feel less comfortable with technology than young

adults or the older adult tendency to feel more satisfied with QoC than young adults will "win out" as both technology and patient satisfaction are highlighted. This juxtaposition makes the current study distinct from any previous work.

CHAPTER 5

BACKGROUND LITERATURE

Advantages of Technology Use in a Medical Setting

Zeman and colleagues (2006) examined the implementation of a Personal Digital Assistant (PDA) as a solution to shortcomings in a health care setting. The particular problems the researchers sought to remedy are as follows: physician consultation times are too short to address all patient issues, physician knowledge about less common patient problems may not be complete or up-to-date, patients with chronic illnesses are not monitored adequately, and patients may be reluctant to discuss certain issues because of related stigma.

Patient-participants completed a computerized health assessment in the waiting room prior to seeing their doctor. A PDA was chosen for implementation of the health assessment because it was the most cost-effective mobile device. The web-based assessment addressed symptoms along with their severity and duration as well as the patient's medication history. The health assessment utilizes branching logic to provide specific diagnoses. After completion of the assessment, the PDA was interfaced with a desktop computer so that an automated report could be printed out for physician use.

Zeman et al. (2006) concluded that the intervention was successful in aiding the physician with eliciting additional patient information without demanding more time. Feigelson and Dwight (2000) reported that patients tend to provide more sensitive information in computerized formats. Given this tendency, Zeman and colleagues posited that it is likely that the patient-participants disclosed more than they would have

otherwise. The detailed information and computerized diagnosis allowed for more tailored treatment plans. Still, Zeman and colleagues warned that there are many challenges to consider when implementing technology in a medical setting. Clinicians and patients, especially in certain cultures, are sometimes distrustful of computerized assessments. Physicians in that study reported concerns that the technology may present barriers between themselves and their patients. Given that 'patient barrier' concerns arose when the technology was limited to the waiting room, those results highlight the need to examine reaction to the introduction of technology in the exam room itself, as is of interest in the current study.

Effects of Computer Implementation in the Exam-Room

Frankel et al. (2005) designed a study to examine the effects on communication between the doctor and patient when a computer was introduced in the exam room. Nine clinicians from a medical care facility that already had plans unrelated to the study to implement exam room computers participated in the study. These clinicians were video taped one month before, one month after, and seven months after the introduction of exam room computers. The recordings included 54 patient-participants who were attending routine visits they had scheduled independently of the study.

Communication concepts from the Four Habits Communication Model were utilized for videotape analysis. The Four Habits Communication Model outlines the following behaviors that are desirable during the medical interview: (1), quickly establish a rapport with the patient, elicit patient concerns, and plan the interview; (2), elicit the patient's perspective with regard to the cause of the symptoms, physical/psychological impact of symptoms, and expectation of visit outcome; (3), demonstrate empathy through

openness to patient's emotions; and (4), complete the visit by delivering diagnoses, giving rationale for options, and involving patient in a plan of action (Frankel & Stein, 1999). After developing and challenging possible hypotheses, the remaining preliminary findings were presented for peer review. The focus of videotape analysis was whether the computer resulted in enhancement or interference of clinician's attention to the patient.

Frankel et al. found that clinician-patient communication was affected in four domains: visit organization, verbal and nonverbal behavior, computer navigation and mastery, and spatial organization of the exam room. In general, the addition of the computer enhanced visit organization performance of clinicians who had performed on a higher level beforehand; and interfered with performance for those clinicians who had previously struggled with visit organization. Likewise, baseline proficiencies and deficiencies with interpersonal communication were amplified. Those clinicians with better interpersonal skills were able to successfully implement the computer as a communication tool, whereas those with less proficient interpersonal skills found the computer to add difficulty. Level of computer mastery was positively related to facilitation. Finally, placement of the computer had effects on ease of communication. Room orientations allowing for maximal face-to-face interaction led to the least communication difficulties.

Frankel et al. provided the first examination of the effects of computers on clinician-patient communication. The resulting effects on verbal and nonverbal behaviors (such as eye contact, posture, gesture) are important because they have implications for outcome of care. However, the study did not include an evaluation of patient perception of the interaction. Though the study makes a clear case that doctor behavior will be

altered due to introduction of exam-room computers, patient reaction to resultant doctor behaviors and to the technology itself remains unexamined, thus again highlighting the need for the current study.

Patient Perceptions of Exam Room Technology

Caldwell et al. (2006) began an investigation, "Phase 1," of the effect of technology use on patient satisfaction that was extended, "Phase 2," by DeBlasio et al. (2007). The study employed a novel methodology in which participants viewed a prerecorded doctor-patient interaction and then completed questionnaires that assessed their evaluation of the quality of care (QoC) delivered. The videotapes were limited to the medical interview portion of the exam. This is when the physician first greets the patient, elicits symptoms and concerns, and documents these in order to update patient records. Unlike previous research that had focused on a single technological device, this study allowed for comparison of five note-taking devices/methods. Specifically, the physician's method of note taking varied between: *Nothing*, *Pen and Paper*, *PDA*, *Desktop Computer*, and *Wearable Computer* (see Table 1).

The study was conducted in two phases; Phase 1 and Phase 2 were identical except that the second phase included a brief explanation of the technology prior to the viewing of the video. In addition to the five technology conditions, the body orientation of the physician was also examined. In all, ten videos illustrate the physician in each technology condition oriented at either 0° or 90° (see Figure 1). Although previous research had found that 0° body orientation (face-to-face) is preferable (Ruusuvuori, 2001; Furnham, Petrides, & Temple, 2006; Ong et al., 1995), there was no main effect of orientation so the findings were collapsed along this dimension.

Table 1. Description of Each of the Five Technology Conditions

- *Nothing:* The physician does not take any tangible notes, but rather relies on his own memory.
- *Paper and pen*: The physician takes hand-written notes onto a pad or directly onto the patient's chart.
- *Personal Digital Assistant (PDA*): The physician is able to electronically store the patient's responses with a PDA and stylus. Additionally, the doctor is able to reference material such as patient history or drug interactions.
- *Desktop Computer* : A computer is used for all the same functions as the PDA, but is visibly more noticeable. Also, instead of the use of a stylus, the doctor uses a keyboard and mouse as input devices.
- *Wearable Computer*: A wearable computer, consisting of a small display attached to the physician's glasses (which may or may not be noticed by the observer) and a one-handed, mobile keyboard, called a Twiddler.

Perceived QoC was operationalized as participant responses on two of the questionnaires: a Quality of Care survey, and an After Video Response sheet. The Quality of Care survey used consisted of 25 questions that allowed the participant to rate the doctor depicted in the video on a Likert scale (Strongly Agree, Agree, Uncertain, Disagree, or Stongly Disagree) along five subscales: 1) general satisfaction with the care given; 2) technical competence; 3) interpersonal skills; 4) communication to the patient; and 5) adequate time spent with the patient. The After Video Response sheet asked participants, "Would you go to this doctor if you had a medical problem?' Additionally, participants could write freely about the video or study in general.

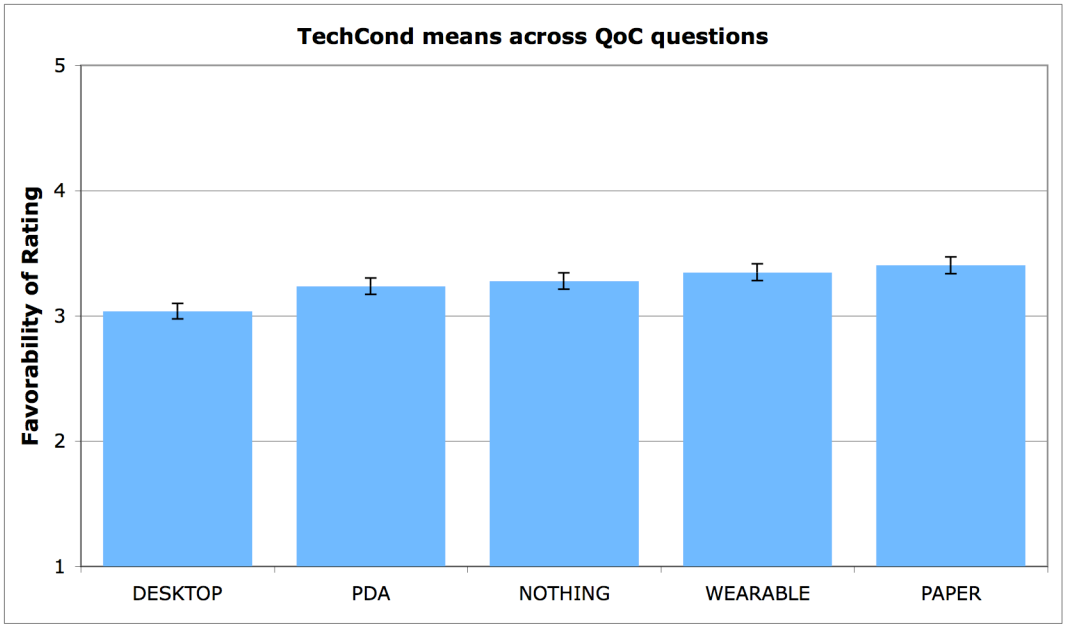


Figure 2. Technology Conditions Means Across QoC Questions.

Results indicated a main effect of technology condition for both phases individually and collapsed across phases (see Figure 2). This indicates that the type of technology used by the physician did have differential effects on perceived QoC. This finding is particularly compelling given that great care was taken to ensure that the videos were nearly identical except for the technology used (equal baseline QoC across cases). That is, the use of technology during the medical interview was the most influential factor on perceived QoC, regardless of actual QoC.

Additionally there was a technology condition by phase interaction, indicating that the explanation of technology prior to video viewing had an effect on perceived QoC for some Technology conditions, but not others (see Figure 3). Particularly, drawing the participant's attention to the technology used decreased favorability of the *Nothing* condition, whereas explaining the purpose of the technology increased ratings for the *Desktop Computer* condition.

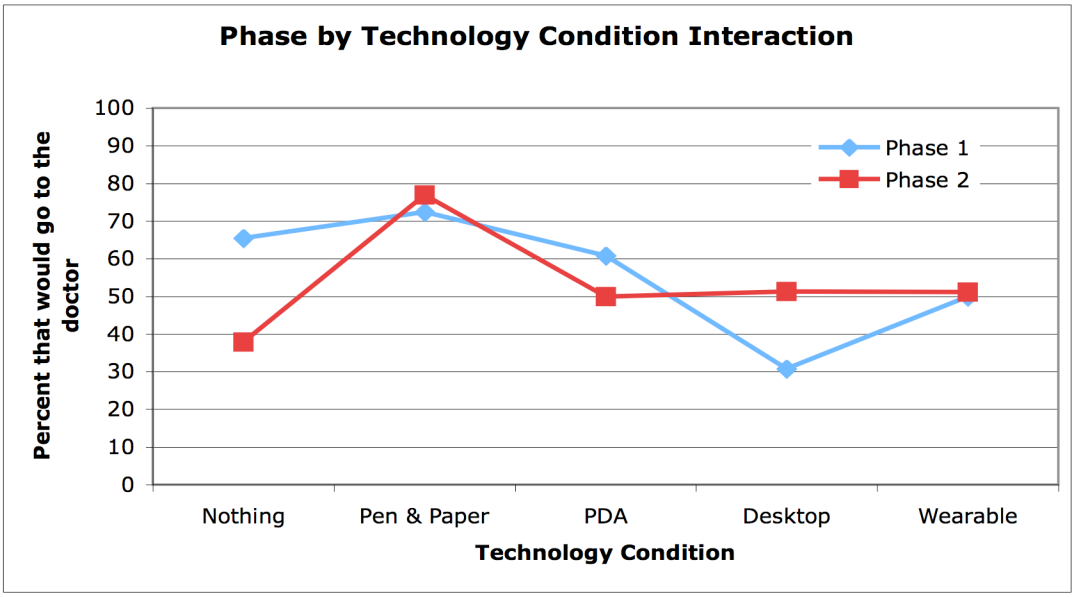


Figure 3. This illustrates interaction between technology condition and the percent of participants reporting that they would go to the doctor depicted.

Participant response was not dependent on gender, health within the last year, or familiarity with technological devices. However, it is likely that this particular group of participants is more familiar with technology given their age (18-26, M= 19.6) and that they are students at a technological institute. This bias was supported by participant results on the Technology Use survey, which were at ceiling. Both the age and level of familiarity with (and perhaps willingness to adapt to) technology of participants in the Caldwell et al. (2006) and DeBlasio et al. (2007) studies are considerable limitations.

Patient Perceptions of Satisfaction by Age

Cohen (1996) sought to develop a model of patient satisfaction as a factor of demographic variables and measures of self-reported health status. Assessment of both health status and patient satisfaction were obtained via surveys that have been shown to be reliable. Cohen acknowledged the shortcomings of assessing these variables through surveys, but posited that the advantages outweigh these in the case of painting a general

picture of patient satisfaction with the variables examined here. He was able to achieve power with an extensive N of 2569. Although Cohen used a popular patient satisfaction survey, the analysis was conducted in a novel way. Whereas researchers often boil down multiple items into a few subscales for what Cohen refers to as "methodological convenience", this study emphasized all factors in an item-by-item analysis (p. 1086). In this way, Cohen was able to draw conclusions on all items he considered to be determinant in patient perception of their health-care experience on a very specific level.

Cohen's study spanned four age groups (16-44, 45-64, 65-74, 75+). Of all demographic items considered, only age proved to be a strong correlate across all items with class showing small effects on some items and gender showing a small effect on fewer items. Those in manual occupations had a slight tendency to report feeling patronized and women tended to report a little less satisfaction than men. The age effects showed a "very notable reduction in dissatisfaction among older adults" (p. 1087). General health measures had a significant, positive relation with satisfaction across all items, but there was not a significant age by general health interaction. Meaning, the degree of reported dissatisfaction with reported ill health did not change along the lines of age group. Age effects persist even when the greater degree of health problems of older adults was taken into account and corrected for. Cohen's study was national and included patient-participants who had experienced a range of health care systems and providers. Any effects of differential note-taking methods were summed across all respondents.

Background Literature Summary

Zeeman and colleagues (2006) demonstrated the successful implementation of a handheld electronic record in the waiting room of a healthcare facility. Frankel and

colleagues (2005) measured effects on the doctor-patient interaction from the doctor's point-of-view due to the implementation of electronic record in the exam room itself. Caldwell and colleagues (2006) followed by DeBlasio and colleagues (2007) considered the differential effects of various documentation methods from the patient's perspective. Finally, Cohen (1996) examined demographic variables as well as general health status in a model of patient satisfaction. In conjunction, these studies set the stage and highlight the importance of the current examination.

Technology use in the medical setting can provide cost-effective and timesaving advantages while providing patients with advanced care through better record keeping and more tailored treatment plans. However, the successful implementation of such technological devices requires a careful balance between the use of the technology and simultaneous interpersonal patient interaction. Introduction of technological devices will alter aspects of the communication between physician and patient. More needs to be understood about patient reaction to the use of exam room technology, resulting changes in patient QoC perception, and methods for encouraging patient technology acceptance. Particular emphasis should be placed on older adult patients, who represent an increasingly larger proportion of the patient population, often have more critical needs than younger patients, and tend to have the least familiarity with technological devices (Czaja et al., 2006; Gorawara-Bhat et al., 2007); but who often report higher levels of patient satisfaction than their younger counterparts (Cohen, 1996; Hall & Dornan, 1990; Larson, 1999; Rahmqvist, 2001).

CHAPTER 6

RESEARCH DESIGN AND METHODS

Participants viewed a video depicting a doctor-patient interaction and then completed pen and paper survey materials that assessed their opinions about the quality of healthcare delivered in the video. The goal of the study was to provide a much-needed examination of patient satisfaction as it relates to age of the patient and the documentation method used by the doctor. The current research design was a 2 (cohort: young, older) by 5 (technology condition: *Nothing*, *Pen and Paper*, *PDA*, *Desktop* , *Wearable*) by 2 (orientation: 0˚, 90˚) between-subjects design.

Participants

In order to obtain a cell size of five, the original recruitment goal was 100 participants. However, because recruitment of young adults occurred more rapidly than recruitment of older adults and there was a desire to continue collecting data from both cohorts over an identical time period, the resulting totals were about two young adults for every older adult. After recruitment and exclusion of incomplete data, there are a total of 152 participants. The collection of young adult data is a replication and extension of previous work by DeBlasio et al. (2007). The collection of older adult data was also similar, with venue, method of recruitment, and compensation being the largest exceptions. The reason for the change of venue is that it was not reasonable to ask older adults to go through the trouble of commuting to campus for a relatively quick study (approximately 60 minutes).

Young Adult

One hundred and seventeen young adults participated at the Georgia Institute of Technology. One hundred and two undergraduate participants were recruited through an on-line web forum, Experimetrix, and participated for extra credit in a psychology course. Fifteen graduate participants were recruited through the psychology department email distribution list and received a monetary compensation of 12 dollars for participation. One undergraduate participant was excluded due to technical difficulties and 13 undergraduate participants were excluded for incomplete data (some items accidentally skipped). The remaining 103 young adult participants range in age from 18 - 39 (mean = 20.83, SD = 3.63).

Older Adult

Sixty-six older adults participated at two affiliated senior activities centers in the Atlanta area. Both centers are a part of a government-sponsored program called naturally occurring retirement communities (NORC). Older adults were recruited through fliers posted in the NORC centers and through their respective weekly newsletters and received a monetary compensation of 12 dollars for participation. Fourteen participants were excluded from analysis because of incomplete data (some items accidentally skipped). The remaining 52 older adult participants range in age from 62-87 (mean = 73.83, SD = 6.62). Because the literature shows much variability in the cognitive abilities of older adults at the minimum and maximum of this age range, age and general abilities performance measures will be further examined for each group in the subsequent Results and Discussion sections.

Apparatus and Stimuli

Videos. In this between-subjects design, each participant watched one of ten brief videos of a "medical interview" between a doctor and patient. The medical interview comprises the questioning portion of the doctor visit; the physical examination and subsequent diagnosis is not depicted. During the interview, the doctor ascertains the patient's symptoms and concerns. The "doctor" in the video was played by a 27 year-old, Caucasian male (see Figure 3). The camera position in the video was from the point-of-view of the patient, who was sitting approximately three feet in front of the physician. The voice of a male patient can be heard on the video while he reports symptoms of an upper respiratory infection, or a common cold, such as: headache, fatigue, loss of appetite, coughing, and so on. Participants can see, as well as hear, the doctor throughout the video. The film was set in a mock-up of a doctor's office including a desk, lamp, medical poster, jar of cotton balls, and plant. The scenario in the film reflected a routine, non-emotional visit to the doctor's office that any participant would experience for a common, non-serious illness. To control the dialogue across all videos, the patient's verbal responses were recorded in advance and this was overlaid onto the audio track for all videos. Audio was presented via Altec Lansing ADA-305 three component speakers.

Viewing

The DVD-quality videos were projected onto a standard projection screen at a viewing distance of approximately 10 feet. Between one and five participants in a session sat facing the screen; however, participants' responses were completed individually. The projected size of the video is approximately 5 x 6.5' (see Figure 4).

Questionnaires

This study used three tasks to assess participant general cognitive abilities and four questionnaires to assess each participant's satisfaction with the apparent QoC demonstrated in the video. The general abilities tasks included a Vocabulary task, a Digit Symbol Substitution task, and a Reverse Digit Span task (see Appendix A.3.1, A.3.2, and A.3.3, respectively). The Vocabulary task, taken from Shipley's Institute of Living Scale, is a reliable, validated 40-item task that asks participants to semantically match one of four words with a target word (see Appendix A.3.1) (Shipley, 1953). The Digit Symbol Substitution task is adapted from Wechsler's (1981) task and tests implicit memory by having participants match symbols to corresponding numbers from memory without having actively tried to memorize the pairings (see Appendix A.3.2). The Reverse Digit Span task measures short-term working memory by having participants write number strings in an order that is reversed from the oral presentation of those strings (see Appendix A.3.3).

The remaining questionnaires were a Background Questionnaire, a Quality of Care survey, an After Video Response sheet, and a Technology Use survey (see Appendix A.2, A.4, A.5, and A.6, respectively). The Background Questionnaire was used to collect demographic information as well as answers to questions such as, "Are you in good health?" (see Appendix A.2). The After Video Response sheet gave participants a chance to respond freely whether they would choose to go to this doctor, comment about the video, or comment about the study in general (see Appendix A.4). The Quality of Care survey was adapted from the Patient Satisfaction Questionnaire-III (PSQ-III) developed by Hays, Hayashi, and Ware (1987) and consists of 40 questions that address

five subscales of QoC: Technical Quality (TECH), General Satisfaction (GSAT), Interpersonal Aspects (INTER), Communication (COMM), and Time Spent with the Doctor (TIME); and a sixth non-QoC subscale Familiarity with the note-taking method (FAMIL) (see Appendix A.5). The Technology Use survey (Czaja et al., 2001). established the participant's familiarity and regular use of a variety of technologies such as a cellular phone or cruise control. The Technology Use data are not reported here.

QoC Subscale Details

Questions under the subscale TECH address the doctor's technical competence. For instance, did the doctor seem to know what he was doing? GSAT subscale questions deal with the participants overall approval of the interaction they viewed. Questions within the INTER subscale deal with the doctor's interpersonal skills. For instance, did he treat the patient with respect? Did the doctor make eye contact with the patient? COMM subscale questions assess whether participants believe the doctor clearly communicated with the patient. Was the patient able to understand what the doctor said to him? Finally, the TIME subscale questions address whether the doctor spent adequate time with the patient.

Methodology Revisions

A few diversions from the previous methodology used in DeBlasio et al. (2007) and Caldwell et al. (2006) should be noted here. The first was on the After Video Response Sheet. Previously, participants were given the choice to answer "yes" or "no" to the question of whether they would chose to visit the doctor depicted in the video. The new version instead gives the participant the opportunity to answer this question on a five-point scale (from 1-5: No, Probably not, Uncertain, Probably, and Yes).

A second change was on the Quality of Care survey. The original survey from which this survey was adapted, the Patient Satisfaction Questionnaire III, was designed to be filled-out by patients in waiting rooms about their firsthand experiences. The person used in the questions was changed from first, "I", to third, "the patient", for the work of Caldwell and colleagues (2006) and the same modification was used here. Further, questions regarding satisfaction with cost of medical care were removed. During pilot data collection for the current study, older adult participants had a difficult time answering questions about the quality of examination of the patient. As discussed before, the videos do not depict the physical examination, but only the medical interview portion of the visit with the explicit assumption that the physical portion will occur after the video. Where undergraduate participants seemed to automatically interpret the word "examine" with something along the lines of "question" or "interview", older adults had complaints about the wording on this survey. To address this, a few of the questions were reworded to more specifically fit the current application (see Apendix A.5).

A third deviation from the previous procedure was also on the QoC survey. The previous QoC survey consisted of 25 items whereas the new QoC survey has been increased to 40 items. The additional 15 items are meant to specifically address a few points that could only be inferred from the previous analysis. For example, "The method used by the doctor to take notes was distracting", "The method used by the doctor to take notes made me trust the doctor less", and "The method used by the doctor to take notes provided him a powerful medical tool". These new items give a more complete picture of participant judgments of each technology condition. Also, the current QoC survey version varies slightly by technology condition. For example, wording on item #35 for

participants in the *Nothing* condition is, "I preferred that the doctor took notes after leaving the exam room instead of during the interview", while wording on the same item for all other technology conditions is, "I would prefer if the doctor took notes after leaving the exam room instead of during the interview." In total, there were six items that vary slightly to suit the appropriate technology condition.

Finally, the Technology Use Survey has been extended to include a more thorough look at each participant's behaviors and attitudes regarding technology. Participants in the *Desktop* , *PDA*, and *Wearable* conditions were given two additional questions to assess their attitudes toward the specific technology used by the doctor in the video. These questions were: "How did it make you feel to watch the doctor in the video using technology during the medical interview seen in the video?" and "Do you feel the technology used by the doctor in the video could benefit the patient? Why or why not?" Again, these questions were added to enable a deeper look at participant response to the videos.

Variables

Independent Variables

The independent variables in the current study were: (1) the type of technology or method used by the physician to input the patient's responses and (2) the orientation of the physician relative to the patient. Five technology conditions were used (*Nothing*, *Pen and Paper*, *PDA*, *Desktop Computer*, and *Wearable Computer*) along with two physician-patient orientations (0 degrees and 90 degrees), for a total of ten conditions, each represented in videos of length 2 minutes and 34 seconds ± 7 seconds (see Figure 4). The 0-degree condition is the case when the doctor is directly facing the patient. The 90-

degree condition is the case when the doctor is facing approximately 90 degrees away from the patient so that he must turn his head to make direct eye contact (see Figure 4).

Dependent Variables

The dependent variable in this study was participant general satisfaction, operationally defined by participant responses to the After Video Questionnaire and the Quality of Care Survey previously described. Specifically, the response to the After Video Questionnaire question, "Would you go to this doctor if you had a medical problem?" was used as a measure of participants' acceptance of the doctor's health care delivery. The 40 questions on the Quality of Care survey are categorized into six subscales: TECH, GSAT, INTER, COMM, TIME, and FAMIL.

Other Examined Factors

In addition to the independent variables, the role of participant cohort, gender, recent health, and familiarity with technology were examined.

Technology Conditions

The use of the word "technologies" in the current study was used to mean the device or method used by the healthcare provider to take notes throughout the entire medical interview. These devices and methods are either currently used or could easily be implemented in a doctor's office. See Table 1 for a full description of each technology condition.

CHAPTER 7

PROCEDURE

During recruitment, participants were told that normal or corrected-to-normal hearing and vision are required for participation. Further, participants were instructed that they must not have participated in a previous version of the current study. When the participant arrived they were first thanked for volunteering their time, then the consent form and Background Questionnaire were distributed. The Background Questionnaire asked the participant demographic information including a self-report of hearing and vision. Next, participants were told that they would be completing a series of general abilities tasks. They were instructed that for each task, the forms would be distributed and the instructions read allowed while they follow along. Care was taken to emphasize that these tasks are designed to be difficult, and that the participant is to try his or her best but not to feel badly if he or she cannot answer every question. The participants were first given the Vocabulary task. Once that was completed the Digit Symbol Substitution task was distributed. Finally, the participants received the Reverse Digit Span task. They were then told that the general abilities task portion of the study was completed.

Next, participants were instructed that they would be viewing a brief video of a doctor-patient interaction. The participants were also informed that the interaction in the video is only part of the visit and to assume that a check-up would follow after the initial interview. Prior to viewing the video, participants were read the technology explanation below that corresponds to their technology condition (see Table 2).

Note that this format changed slightly from that used in the previous study (DeBlasio et al, 2007). Previously, the *Nothing* and *Pen and Paper* condition explanations were combined into one statement that read, "The doctor may or may not be using a pen and paper…" Data from this study revealed significantly lower ratings of the *Nothing* condition. The lower ratings may have been due to the nature of the statement, which can be construed as pointing out the doctor's lack of tangible note-taking device as a negative factor. To address this, the *Nothing* condition is given an individual technology explanation that does not put this method in a negative light. Lastly, the participants are informed that they will be given some questionnaires to complete after watching the video that will evaluate their perception of the doctor-patient interaction. Once the video is complete, the participants are given the Quality of Care Questionnaire, then the After Video Response sheet, and then the Technology Use survey, in that order. Finally, the participants are debriefed. Participants remain unaware of other Technology Conditions until debriefing.

Table 2. Running Script Read by Researcher to Participants Prior to Video Viewing.

1	Today you will watch a brief video of a doctor and patient interaction. Specifically you will be viewing the medical interview portion of the exam. This is the portion of the exam when the doctor is asking the patient questions in order to assess his symptoms and concerns. This comes before the physical exam, so you won't see the doctor touch the patient or give a diagnosis. We will not be viewing these portions of the exam today. [INSERT CORRESPONDING TECHNOLOGY CONDITION BELOW]	
2	**Nothing**	In the video the doctor will be taking mental note of the patients symptoms and concerns. You are to assume that he will document these in order to update the patient's records after the examination is complete.
	Paper	In the video, the doctor will be using pen and paper to document the patient's symptoms and concerns in order to update the patient's records.
	PDA	In the video, the doctor will be using a personal digital assistant, or PDA, to document the patient's symptoms and concerns in order to update the patient's records. The PDA is a handheld computing device that the doctor will use to input notes.
	Desktop	In the video, the doctor will be using a desktop computer to document the patient's symptoms and concerns in order to update the patient's records. The desktop computer consists of a monitor and keyboard that the doctor will use to input notes.
	Wearable	In the video, the doctor will be using a wearable to document the patient's symptoms and concerns in order to update the patient's records. The wearable computer consists of a small screen connected to the doctor's glasses and a one-handed keyboard, called a twiddler, that the doctor will use to input notes.
3	After watching the video, you will be given some questionnaires that evaluate your perception of the doctor patient interaction. There are no right or wrong answers on these, you will give your opinions based on the judgments you make from viewing the brief interaction. Are there any questions?	

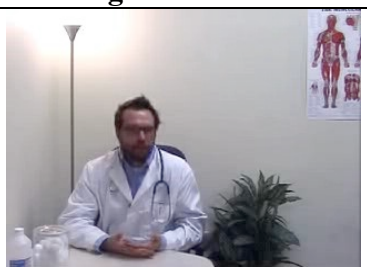
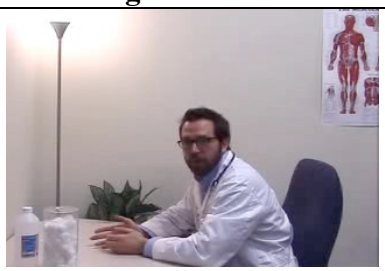
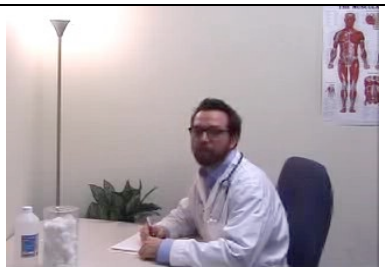
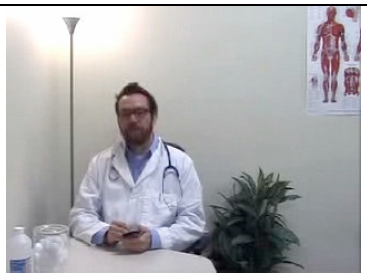
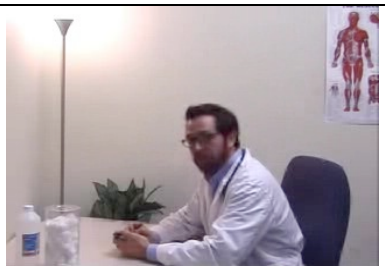
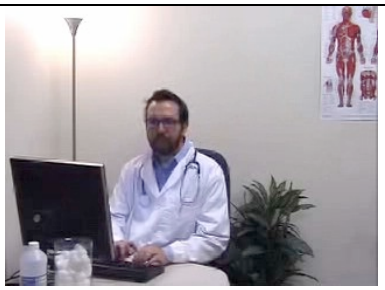
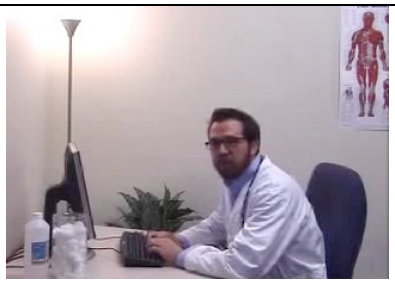
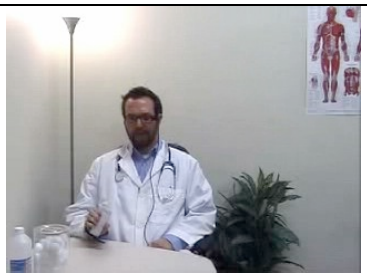
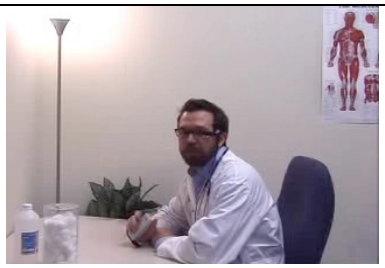
	0-Degree Conditions	90-Degree Conditions
Technology Type	 a. Nothing (no technology)	 a. Nothing (no technology)
	 b. Paper and Pen	 b. Paper and Pen
	 c. Personal Digital Assistant (PDA)	 c. Personal Digital Assistant (PDA)
	 d. Desktop Computer	 d. Desktop Computer
	 e. Wearable Computer	 e. Wearable Computer

Figure 4. Still clips from each of the video conditions.

CHAPTER 8

HYPOTHESES

Hypothesis 1: Orientation Main Effect

Based on the communication literature, I predict that there will be a main effect of Orientation on some of the QoC items. Specifically, I predict that there will be a main effect of Orientation on the 12 new QoC items that measure patient satisfaction (but not on the three new items that measure familiarity) because my previous work with the first 25 QoC did not reveal a Orientation main effect and I have no reason to suspect that they would now.

Hypothesis 2: **Cohort Main Effect**

I predict that there will be a main effect of Cohort. It may be the case that older adults rate the doctor more favorably than young adults overall due to the tendency of increased patient satisfaction with age. On the other hand, it may be that older adults tendency to have negative judgments of technology will lead to less favorable ratings of the doctor because there are a greater number of technology conditions using a device (*Desktop* , *PDA*, *Wearable*) than not (*Nothing*, *Paper*).

Hypothesis 3: TechCond Main Effect

3A: Based on my previous work, I predict that the *Wearable* and *Paper* conditions will be rated most favorably overall on the preexisting QoC items (QoC 1-25) as well as new QoC items 26, 27, and 36 (as these were adapted directly from the PSQ-III just as the first 25 items were).

3B: Of the remaining new items, I predict a different pattern. For QoC items 28, 30, 32, 33, and 35 which all concern accuracy of documentation, I predict that technology conditions that implement devices (*Desktop* , *PDA*, and *Wearable*) will be rated higher than *Nothing* and *Paper*.

3C: For new QoC items 29, 31, and 37, which concern nonverbal communication, I predict that the device conditions will be rated less favorably than the *Nothing* and *Paper* conditions.

3D: Finally, I predict that for the FAMILIARITY items (QoC 38-40), the *Wearable* condition will be rated less familiar than the other conditions.

Hypothesis 4: Gender Main Effect

I predict that there will be a main effect of Gender on some of the QoC items. Specifically, based on the literature I predict that males will rate the doctor more favorably than females. However, I only make this prediction for the 12 new QoC items

that measure patient satisfaction (but not on the three new items that measure familiarity) because my previous work with the first 25 QoC did not reveal a Gender main effect and I have no reason to suspect that they would now.

Hypothesis 5: Cohort x TechCond Interaction

Taking both the technology and patient satisfaction aging literature, I predict that older adults will rate the doctor more favorably than young adults in the technology conditions that do not use a device (*Nothing*, *Paper*), but will rate the doctor less favorably in the conditions that do utilize a device (*Desktop* , *PDA*, *Wearable*).

CHAPTER 9

ANALYSIS

Participant Group Comparisons

Some degree of age-related decline in cognitive function is an unavoidable reality. Characterized by widespread decreases in neural efficiency and significant cerebral cell loss, the aging brain cannot perform at the levels of which it was once capable (Reuter-Lorenz, Stanczak, & Miller, 1999). The literature indicates that there much variability between the average cognitive abilities of an older adult in his or her early sixties versus an individual in his or her late eighties (Wilson, Beck, Bienias, & Bennett, 2007). To address this, the mean ages and performance on the three general abilities tasks were calculated for each participant group. These means are presented in Table 3 for older adult participants and Table 4 for young adult participants. For clarity, these group means and their respective standard deviations were used to calculate Z-scores for both older and young adults, these are presented in Figures 5 and 6. No group in either cohort is more than two standard deviations for age or any measure. As expected, there is greater variability in the older adult cohort than the young adult cohort. Independent samples t-tests also reveal the following expected results: young adults performed significantly better than older adults on the Reverse Digit Span task ($t = -7.75$, $p < 0.001$) and the Digit Symbol Substitution task ($t = -9.02$, $p < 0.001$) and older adults performed better, though only marginally than young adults on the Vocabulary task ($t = 1.82$, $p = 0.070$). These results take into account Levene's test for equality of variances (see Figures 7, 8, and 9).

Table 3. Mean Ages and Scores on the General Abilities Tasks for OA Participants

Means / Technology Conditions	Age	N (M,F)	Vocabulary	Reverse Digit Span	Digit Symbol Substitution
0 *DESKTOP*	69.0	5 (0,5)	32.6	8.8	4.0
0 *PDA*	77.0	6 (1,5)	33.0	7.7	2.0
0 *WEARABLE*	73.7	5 (0,5)	32.8	8.2	4.8
0 *PAPER*	73.2	5 (2,3)	34.0	8.8	5.0
0 *NOTHING*	70.6	5 (2,3)	33.6	8.2	6.2
90 *DESKTOP*	75.6	5 (1,4)	34.0	10.0	4.8
90 *PDA*	68.3	5 (2,3)	32.6	7.8	3.4
90 *WEARABLE*	75.6	5 (1,4)	32.2	9.4	5.4
90 *PAPER*	80.7	5 (1,4)	34.4	6.6	6.0
90 *NOTHING*	76.2	6 (1,5)	32.5	7.5	3.2

Table 4. Mean Ages and Scores on the General Abilities Tasks for YA Participants

Means / Technology Conditions	Age	N (M,F)	Vocabulary	Reverse Digit Span	Digit Symbol Substitution
0 *DESKTOP*	20.4	9 (5,4)	31.3	11.7	8.1
0 *PDA*	22.6	10 (4,6)	32.8	10.4	8.0
0 *WEARABLE*	21.8	11 (7,4)	32.8	11.3	7.7
0 *PAPER*	19.9	10 (3,7)	32.1	11.4	8.2
0 *NOTHING*	20.8	10 (5,5)	32.3	11.5	8.3
90 *DESKTOP*	20.0	11 (7,4)	29.6	9.9	7.6
90 *PDA*	21.1	10 (1,9)	32.8	11.8	8.2
90 *WEARABLE*	20.2	11 (7,4)	31.1	10.6	8.0
90 *PAPER*	19.7	11 (7,4)	33.1	11.5	7.6
90 *NOTHING*	22.7	10 (4,6)	33.7	11.5	7.7

Lastly, 1-tail Pearson correlations were conducted between age and the abilities tasks within the respective cohorts. There was no significant in-group age correlation for older adults with vocabulary or symbol substitution scores, but there was a significant correlation for reverse digit span scores ($r = -0.42$, $p = 0.001$). There is not a significant in-group correlation with age for young adult reverse digit span scores, but there are significant in-group correlations for age with both vocabulary ($r = 0.16$, $p = 0.050$) and

symbol substitution (r = -0.25, p = 0.006). The direction of the young adult correlations are the expected directions for these age by task abilities correlations (positive for vocabulary, negative for the digit symbol substitution, which measures short-term implicit memory) but surprising given that the young adult age range would not be expected to show any significant age correlations.

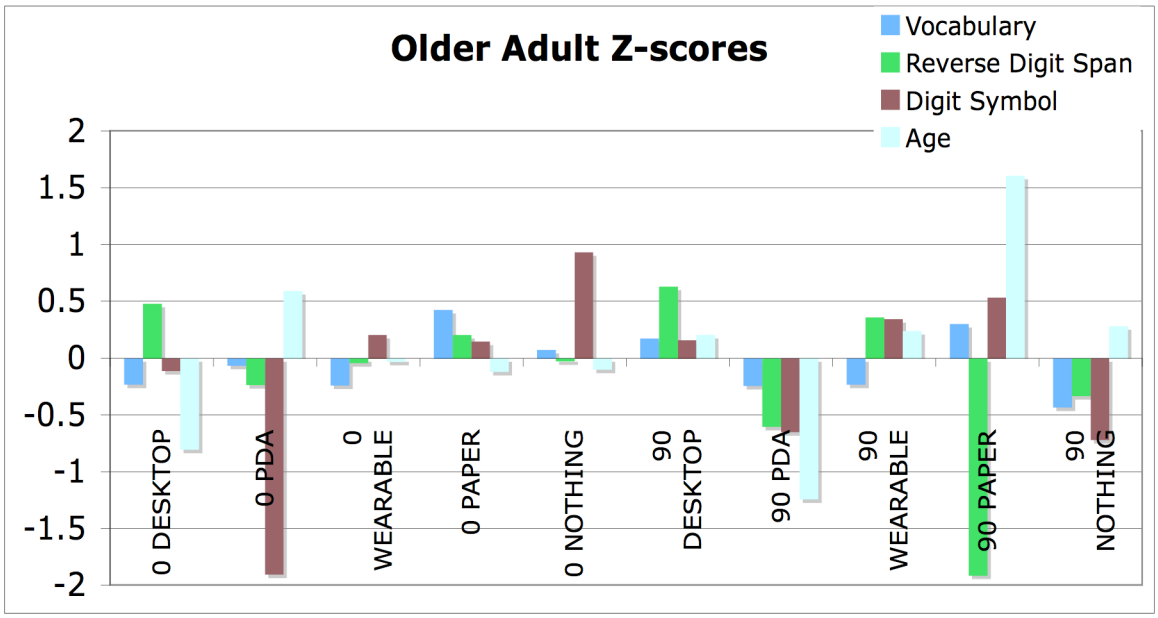


Figure 5. Group z-scores for older adults in each technology condition.

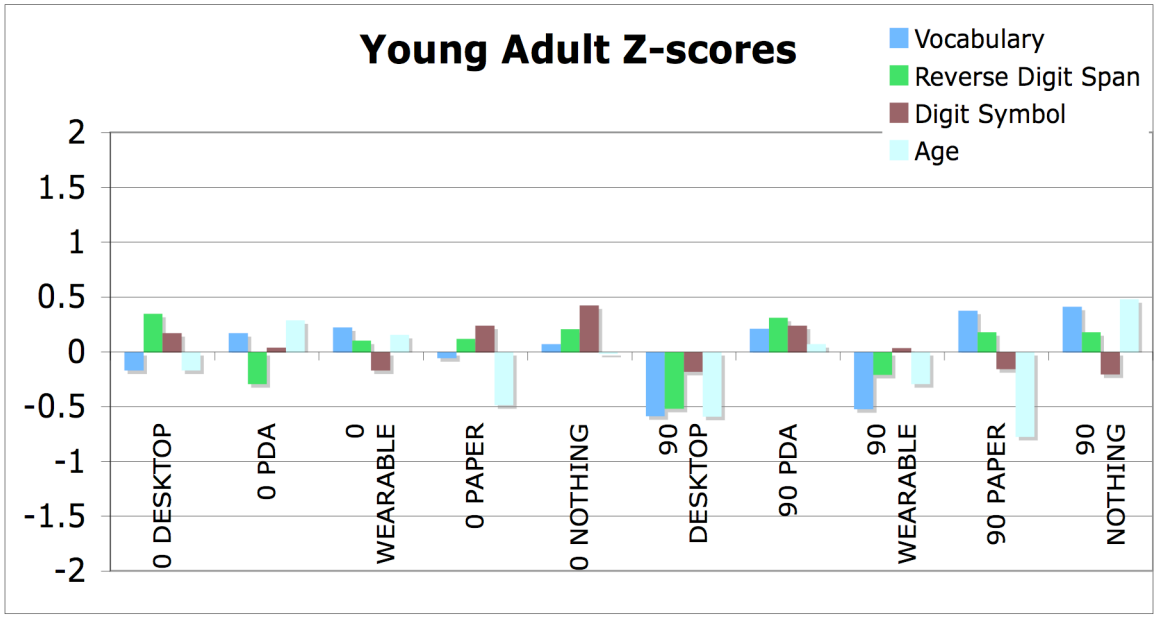


Figure 6. Group z-scores for young adults in each technology condition.

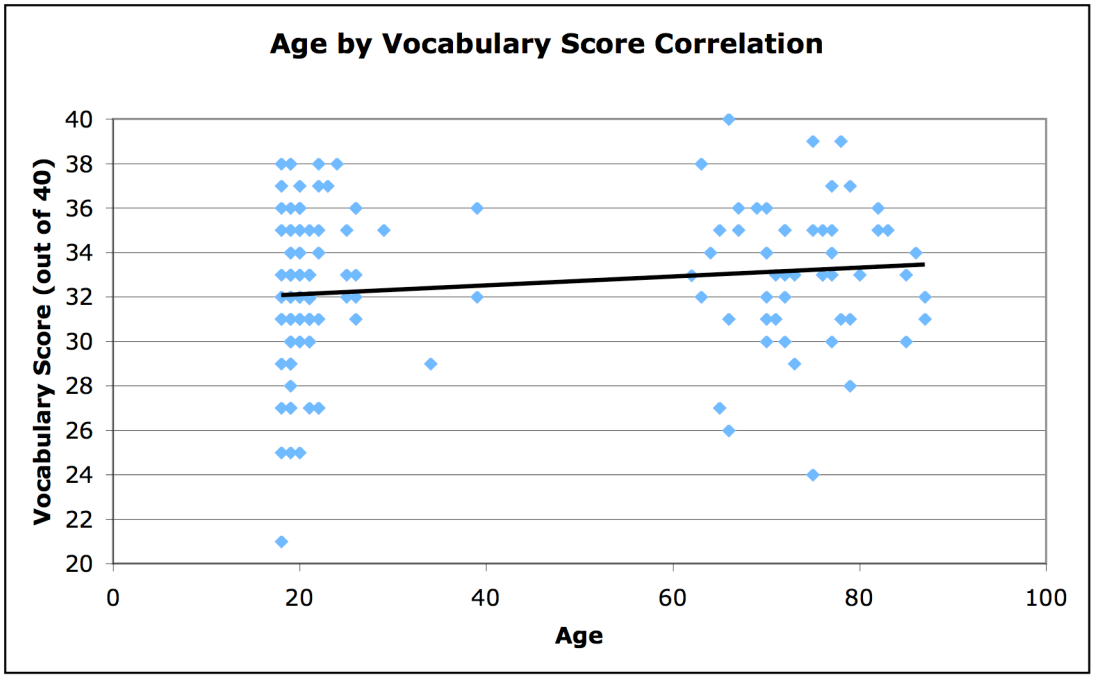


Figure 7. Correlation between age and vocabulary score.

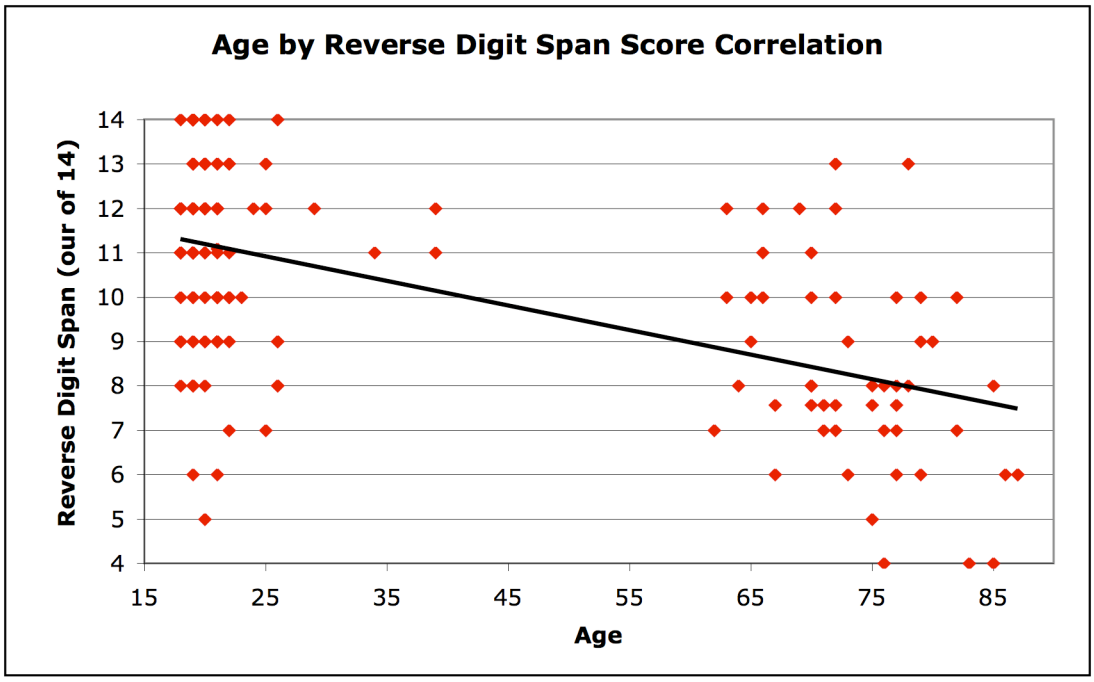


Figure 8. Correlation between age and Reverse Digit Span score.

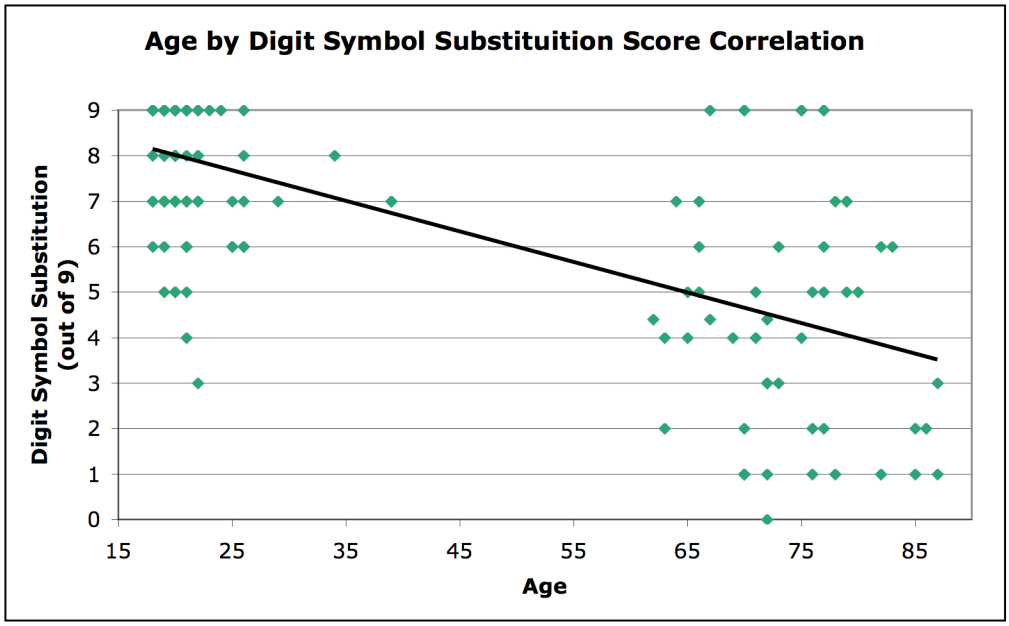


Figure 9. Correlation between age and digit symbol substitution score.

QoC Survey

Scoring on the Quality of Care questionnaire was calculated by assigning scores of one through five on each of the 40 items. For example, 'Strongly Agree' = 1, 'Agree' = 2, 'Uncertain' = 3, 'Disagree' = 4, 'Strongly Disagree' = 5. Thirty-seven of the items were meant to gauge participant perception of the quality of care delivered by the doctor in the video. The remaining three items were meant to measure participant familiarity with the device or method used by the doctor to take notes in the video. Each QoC item was coded individually to account for the direction of wording such that a score of "5" reflects the most favorable judgment of the doctor. On the familiarity items, a score of "1" reflects the least familiarity with the method or device. Because participants were given the option of answering 'uncertain' (coded as "3") on the Quality of Care questionnaire, a one-sample, two-tailed t-test was used against a test value of "3" to ensure that participants generally indicated an opinion one way or another. Results showed that participant answers were significantly different from "3" on 33, and

marginally significant on two, of the 37 items gauging perception of QoC. The two remaining questions that were not significantly different are items number 4 and 20, "The doctor should have given the patient more respect" and "All things considered, the medical care the patient received was excellent."

Table 5. 1-tail One-way ANOVA Table with WouldGo as the Factor.

		Sum of Squares	df	Mean Square	F	Sig.
AllQoC	Between Groups	32937.03	5	6587.41	29.17	0.001
	Within Groups	33652.95	149	225.86		
	Total	66589.97	154			
FAMIL	Between Groups	236.75	5	47.35	2.53	0.031
	Within Groups	2787.41	149	18.71		
	Total	3024.16	154			
TECH	Between Groups	2480.93	5	496.19	16.94	0.001
	Within Groups	4364.26	149	29.29		
	Total	6845.19	154			
GSAT	Between Groups	2106.62	5	421.32	29.78	0.001
	Within Groups	2108.00	149	14.15		
	Total	4214.62	154			
INTER	Between Groups	3388.53	5	677.71	16.37	0.001
	Within Groups	6168.56	149	41.40		
	Total	9557.10	154			
COMM	Between Groups	364.49	5	72.90	15.68	0.001
	Within Groups	692.91	149	4.65		
	Total	1057.39	154			
TIME	Between Groups	92.48	5	18.50	7.14	0.001
	Within Groups	386.00	149	2.59		
	Total	478.48	154			

One assumption is that perception of QoC should relate to actual patient outcomes. To test that this was the case in our current data, a 1-tail one-way ANOVA was run with the variables WouldGo (measure of actual outcome), AllQoC (measure of patient satisfaction), and each subscale (See Table 5). Results are significant for each measure at the $p < 0.001$ level for AllQoC and each subscale except FAMIL which was at the $p = 0.031$ level. An item-by-item analysis showed that more favorable responses to WouldGo were significantly related to higher QoC scores on all but three QoC items: QoC 3, QoC 8, and QoC 13. Two of the three FAMIL subscale items were significantly related to WouldGo, but not QoC 40 which stated, "I have used a note-taking method like

the one used by the doctor in the video".

MANOVA Analysis

An initial use of the collapsed QoC score, AllQoC and participant Likert responses as to whether they would go to the doctor for a medical problem (WouldGo) revealed no effects with the factors examined. Thus, further analyses included a question-by-question break down as used and defended by Cohen (1996). A Multivariate Analysis of Variance (MANOVA) was used to reveal significant main effects and interactions. Pillai's Trace is the multivariate test statistic of choice for all factors because it has been argued as the most powerful statistic when differences among the groups do not tend to fall primarily on one dimension, but rather have a diffuse structure, as is the case here. The following variables were entered as dependent factors: QoC 1-40, YNWouldGo (WouldGo data converted into bivariate yes/no data), TECH (subgroup consisting of QoC items relating to technical quality: 1, 3, 10, 13, 17, 22, 25, 26, 28, 30, 32, 33, and 36), GSAT (subgroup consisting of QoC items relating to general satisfaction: 2, 5, 9, 14, 20, 24, and 35), INTER (subgroup consisting of QoC items relating to interpersonal aspects: 4, 7, 11, 12, 15, 19, 27, 29, 31, 34, and 37), COMM (subgroup consisting of QoC items relating to communication: 6, 8, 18, 21,) TIME (subgroup consisting of QoC items relating to amount of time spent: 16, 23), FAMIL (subgroup consisting of QoC items relating to familiarity with device or method used by the doctor to take notes: 38, 39, 40), Health (participant self-report of health within the last year), Health Change (participant self-report of changes in health within the last year), and Dr. Visits (participant self-report of number of doctor visits within the last year). The variables entered as fixed factors were: Cohort (older adult, young adult), Orientation (0 degrees, 90 degrees),

Gender (Male, Female), and TechCond (*Nothing*, *Paper*, *Desktop* , *PDA*, *Wearable*).

Main Effect of Orientation

The MANOVA did not yield a significant main effect of orientation, however, subsequent univariate tests did yield an orientation main effect on only one dependent factor: item number 30 on the QoC questionnaire (see Figure 10).

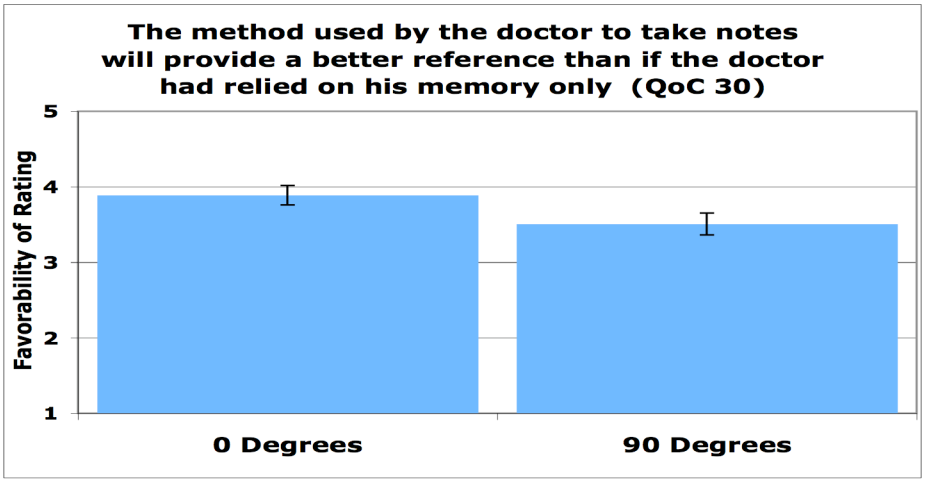


Figure 10. Main Effect of Orientation (QoC 30). Participants in the 0-Degree condition rated the doctor more favorably than participants in the 90-Degree condition did. QoC 30: $F(1,135) = 7.302$, $p = 0.008$

Main Effect of Cohort

The MANOVA revealed a main effect of cohort $F(41, 95) = 2.570$, $p < 0.001$ (Pillai's Trace). Subsequent univariate tests revealed significant results on 13 of the 40 Quality of Care questionnaire items. However, further analysis revealed significant 2 and 3-way interactions on three of these 13 items. Younger adults rated the doctor more favorably on seven of the remaining ten items, four of which fell into the TECH subscale (see Figure 11). The rest of the cohort main effect items where young adults rated the doctor more favorably than older adults did fall into the COMM (QoC 6 and QoC 8) and TIME (QoC 23) subscales (see Figures 12 and 13, respectively). There are three items that older adults rated the doctor more favorably than younger adults; all of which fell

into the INTER subscale (see Figure 14). Lastly, there were two subscales that reveal a main effect of cohort: TECH and TIME. Young adults rated the doctor more favorably than older adults in both of these subscales (see Figure 15).

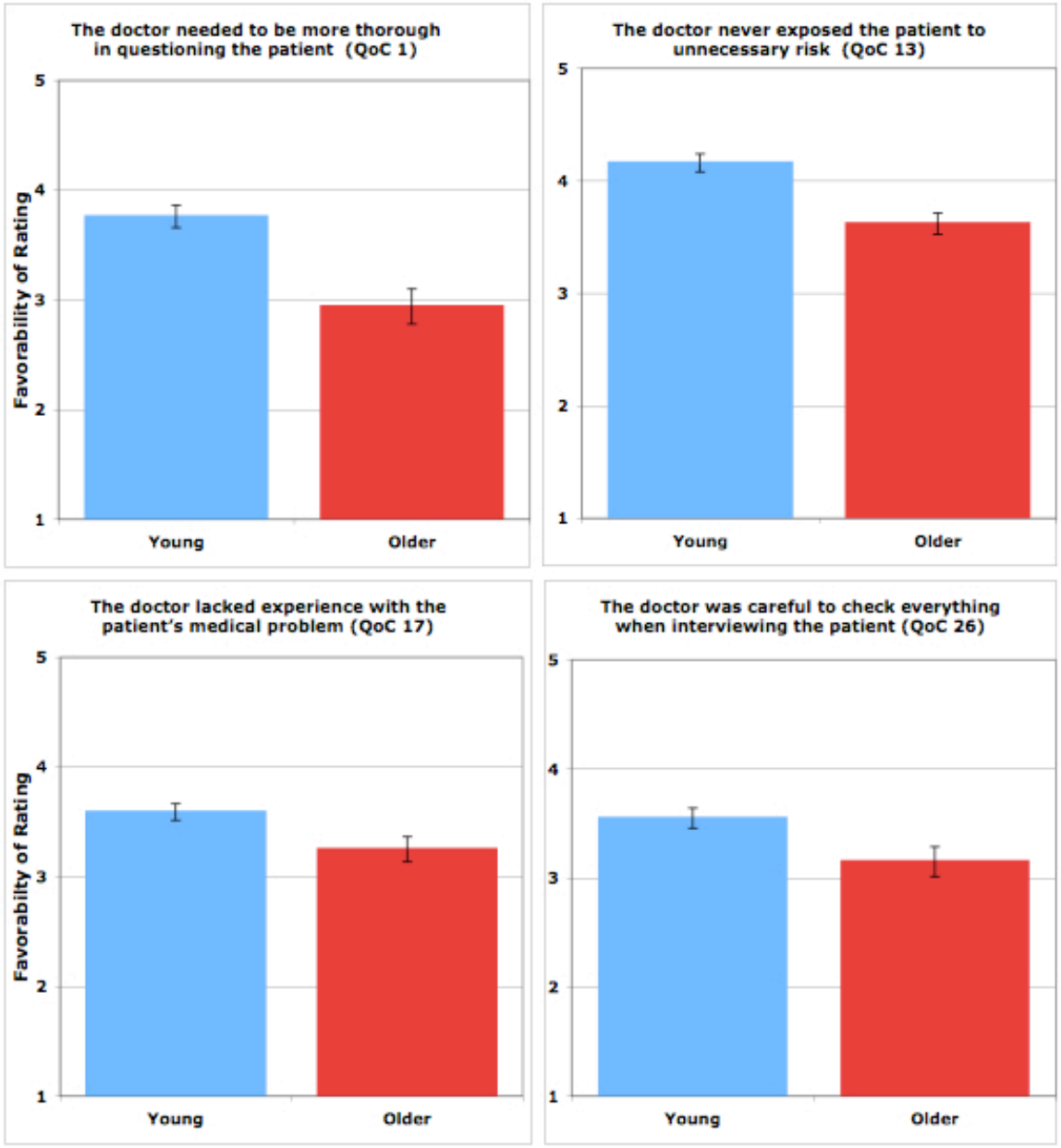


Figure 11. Cohort Main Effect in TECH with YA rating more favorably than OA. A score of 1 reflects the least favorable and score of 5 reflects the most favorable judgment of the doctor. QoC: $F(1,135) = 19.256$, $p = 0.001$; QoC 13: $F(1,135) = 16.649$, $p < 0.001$; QoC 17: $F(1,135) = 6.163$, $p = 0.014$; QoC 26: $F(1,135) = 5.969$, $p = 0.018$

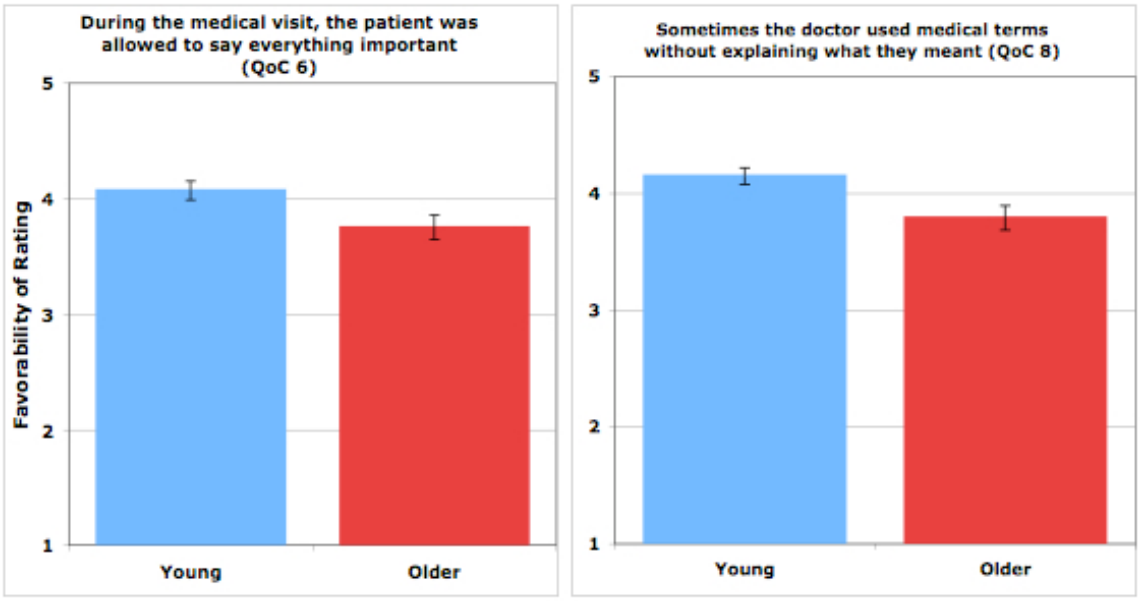


Figure 12. Cohort Main Effect in COMM with YA rating more favorably than OA. A score of 1 reflects the least favorable and score of 5 reflects the most favorable judgment of the doctor. QoC 6: $F(1,135) = 5.066$, $p = 0.026$; QoC 8: $F(1,135) = 7.261$, $p = 0.008$

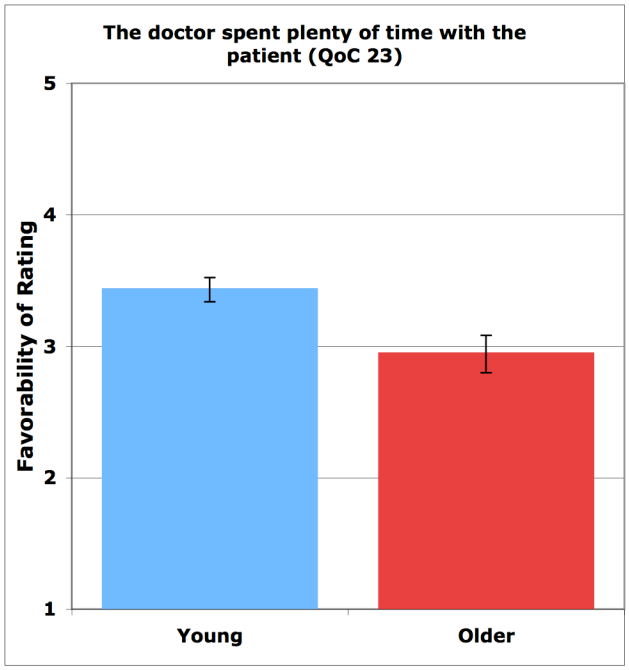


Figure 13. Cohort Main Effect in TIME with YA rating more favorably than OA. A score of 1 reflects the least favorable and score of 5 reflects the most favorable judgment of the doctor. QoC 26: $F(1,135) = 5.969$, $p = 0.018$

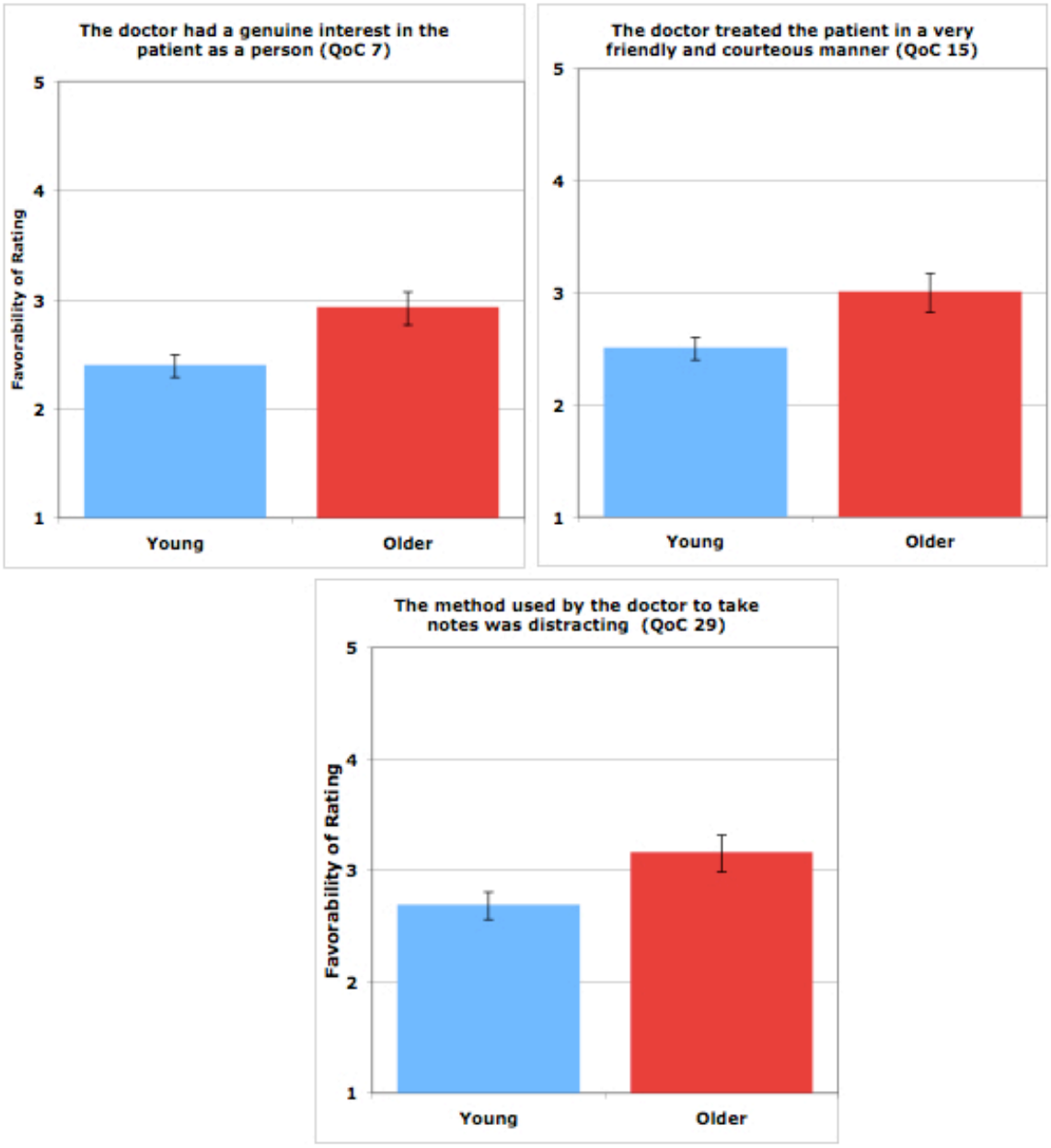


Figure 14. Cohort Main Effect in INTER with OA rating more favorably than YA. A score of 1 reflects the least favorable and score of 5 reflects the most favorable judgment of the doctor. QoC 7: $F(1,135) = 8.682$, $p = 0.004$; QoC 15: $F(1,135) = 6.821$, $p = 0.010$; QoC 29: $F(1,135) = 6.279$, $p = 0.013$

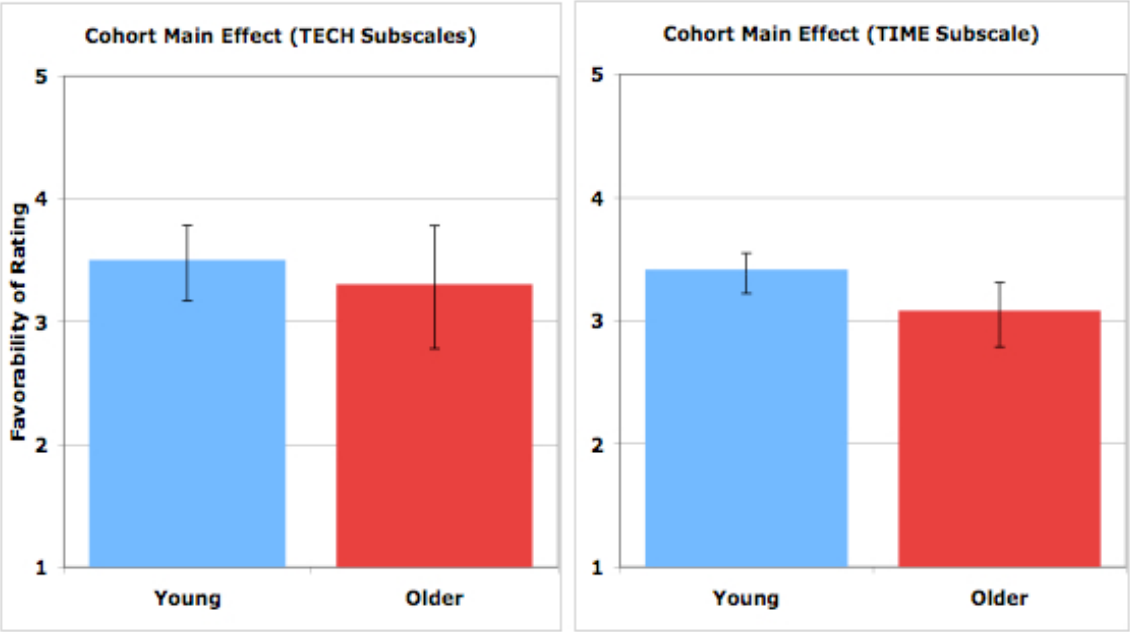


Figure 15. Cohort Main Effect in subscales with YA rating more favorably than OA. TECH: $F(1,135) = 5.170$, $p = 0.025$; TIME: $F(1,135) = 5.145$, $p = 0.025$

Main Effect of TechCond

A MANOVA revealed a main effect of TechCond $F(164, 392) = 2.606$, $p < 0.001$ (Pillai's Trace). Subsequent univariate tests revealed several interesting results. Four of the items showing a main effect of TechCond all relate to the documentation method used during the medical interview (see Figure 16). The next set of four items that show a main effect of TechCond are all related to issues of trust, eye contact, and distraction (see Figure 17). All items related to familiarity (QoC 38-40 and subgroup FAMILIARITY) showed a significant main effect of TechCond, but all other items besides QoC 38 also showed 2 and 3-way interactions, which are depicted later. QoC 38 is the only item related to familiarity that showed a main effect of TechCond only (see Figure 18). Lastly, one item and one subgroup related to technical quality showed a main effect of TechCond (see Figure 19).

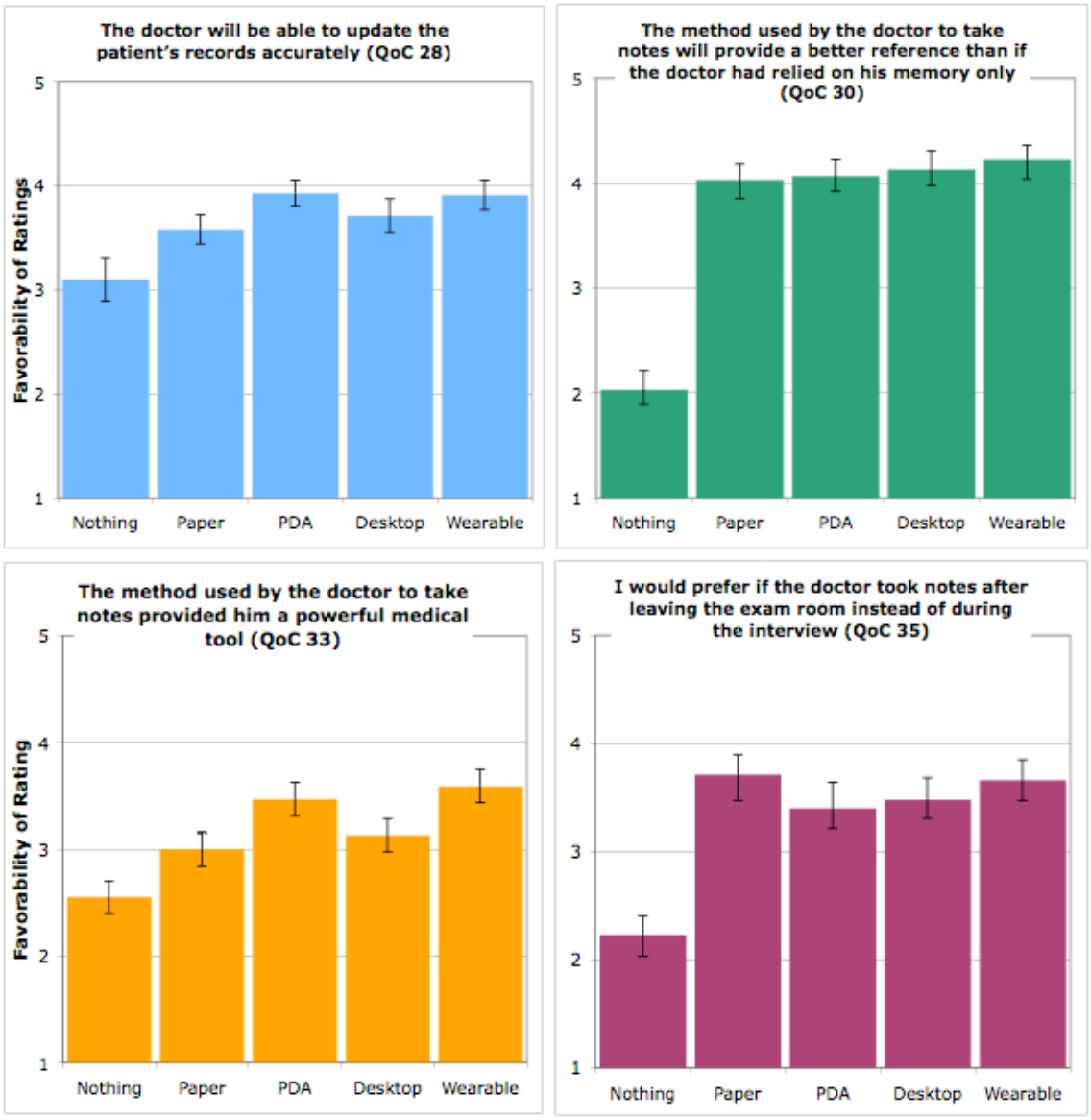


Figure 16. TechCond Main Effect items relating to the documentation during the medical interview. A score of 1 reflects the least favorable and score of 5 reflects the most favorable judgment of the doctor. QoC 28: *Nothing* is rated less favorably than *Desktop* ($p = 0.003$) and *Wearable* ($p = 0.004$) and marginally less favorably than *PDA* ($p = 0.059$). QoC 30: *Nothing* is rated less favorably than any other condition ($p < 0.001$). Wording on this question for participants in the *Nothing* condition is, "Notes recorded during the interview would have provided a better reference than the doctor relying on his memory only." Data analysis took this direction reversal into account. QoC 33: *Nothing* is rated less favorably than *Desktop* ($p = 0.001$) and *Wearable* ($p < 0.001$) and marginally less than *PDA* ($p = 0.065$). *Paper* is rated marginally lower than *Wearable* ($p = 0.053$). QoC 35: *Nothing* is rated less favorably than all conditions ($p < 0.001$). Wording on this question for participants in the *Nothing* condition is, "I preferred that the doctor took notes after leaving the exam room instead of during the interview." Data analysis took this direction reversal into account.

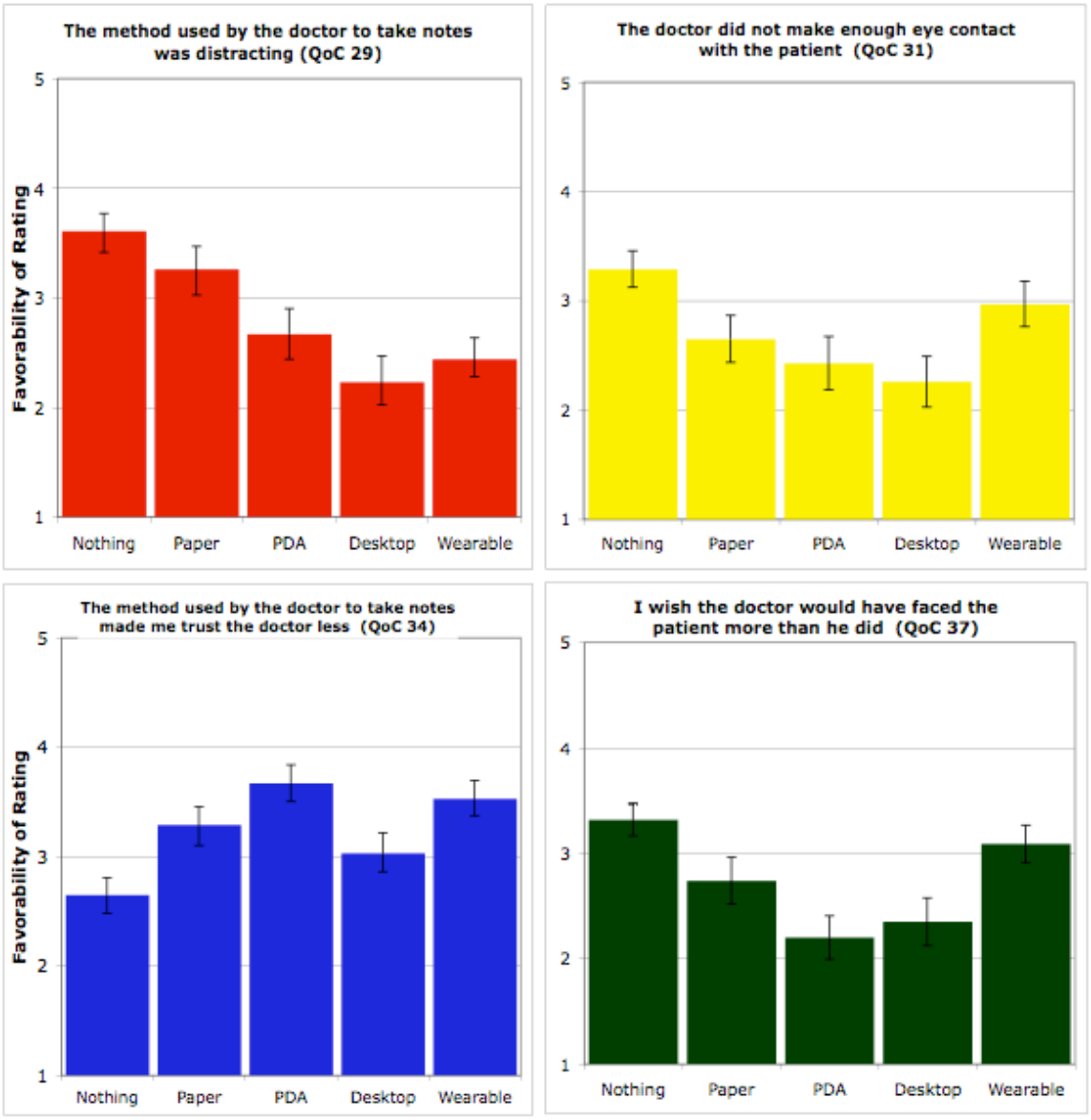


Figure 17. TechCond Main Effect on items relating to trust, eye contact, and distraction during the medical interview. A score of 1 reflects the least favorable and score of 5 reflects the most favorable judgment of the doctor. QoC 29: *Nothing* is rated more favorably than *PDA* ($p < 0.001$), *Wearable* ($p = 0.001$), and *Desktop* ($p = 0.012$). *Paper* is rated more favorably than *PDA* ($p = 0.004$) and *Wearable* ($p = 0.038$). QoC 31: *Nothing* is rated more favorably than *Desktop* ($p = 0.044$) and *PDA* ($p = 0.007$). QoC 34: *Nothing* is rated less favorably than *Desktop* ($p < 0.001$) and *Wearable* ($p = 0.002$) and marginally less than *Paper* ($p = 0.057$). *PDA* is rated marginally less favorably than *Desktop* ($p = 0.067$). QoC 37: *Desktop* is rated less favorably than *Nothing* ($p = 0.001$) and *Wearable* ($p = 0.015$). *PDA* is rated less favorably than *Nothing* ($p = 0.007$) and marginally less than *Wearable* ($p = 0.066$).

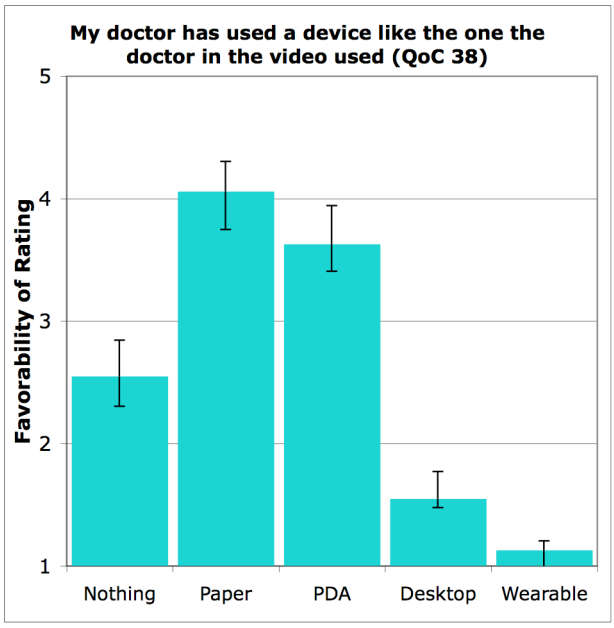


Figure 18. TechCond Main Effect on an item related to familiarity with the device shown in the video. A score of 1 reflects the least favorable and score of 5 reflects the most favorable judgment of the doctor. QoC 38: *Wearable* is rated less familiar than *Nothing*, *Paper*, and *Desktop* ($p < 0.001$). *PDA* is rated less familiar than *Nothing* ($p = 0.025$), *Paper* ($p < 0.001$), and *Desktop* ($p < 0.001$). *Nothing* is rated less familiar than *Paper* ($p < 0.001$) and *Desktop* ($p = 0.013$).

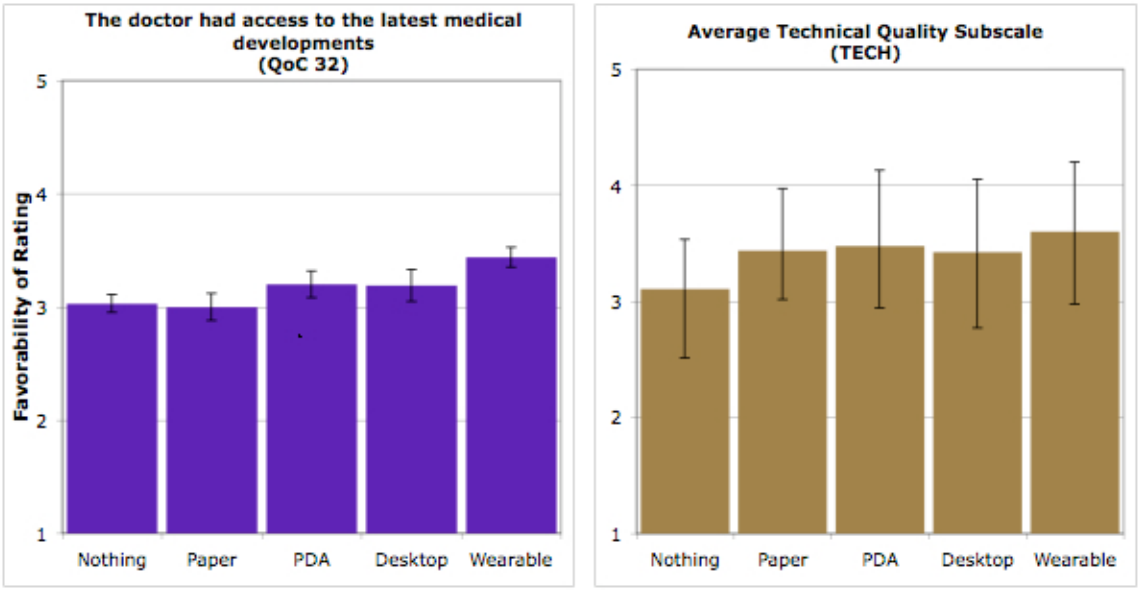


Figure 19. TechCond Main Effect on an item and a subgroup related to technical quality. A score of 1 reflects the least favorable and score of 5 reflects the most favorable judgment of the doctor. QoC 32: *Wearable* is rated significantly more favorably than *Paper* ($p = 0.042$) and marginally more than *Nothing* ($p = 0.072$). TECH: *Nothing* is rated less favorably than *Desktop* ($p = 0.028$) and *Wearable* ($p = 0.001$) and marginally less than *Paper* ($p = 0.060$) and *PDA* ($p = 0.082$).

Main Effect of Gender

A MANOVA does not yield a significant main effect of gender, however, subsequent univariate tests yield a gender main effect on three items within INTER and one item within TECH (see Figures 20 and 221, respectively). Interestingly, females rated the doctor more favorably in all four cases.

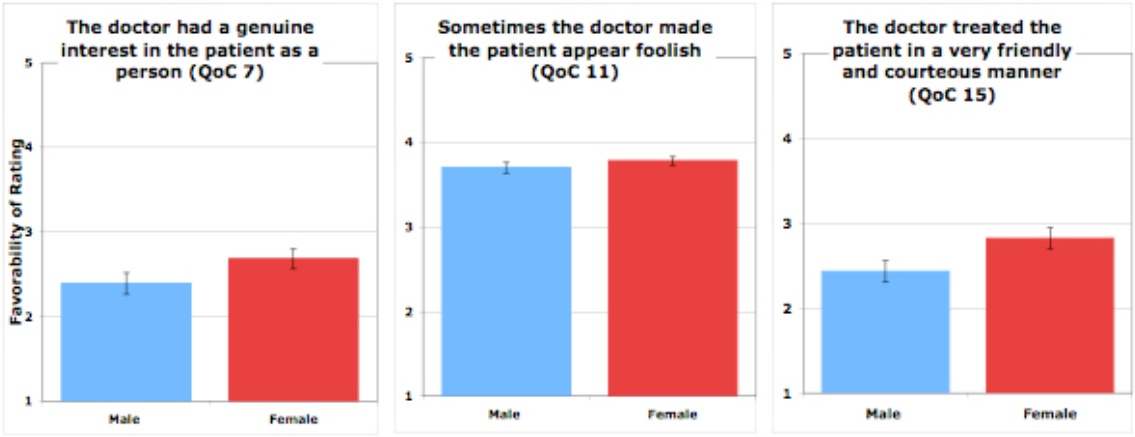


Figure 20. Gender Main Effect of Gender on items relating to interpersonal aspects (INTER). Females rated the doctor more favorably than males did. QoC 7: $F(1,135) = 4.339$, $p = 0.040$; QoC 11: $F(1,135) = 4.699$, $p = 0.033$; QoC 15: $F(1,135) = 6.038$, $p = 0.016$

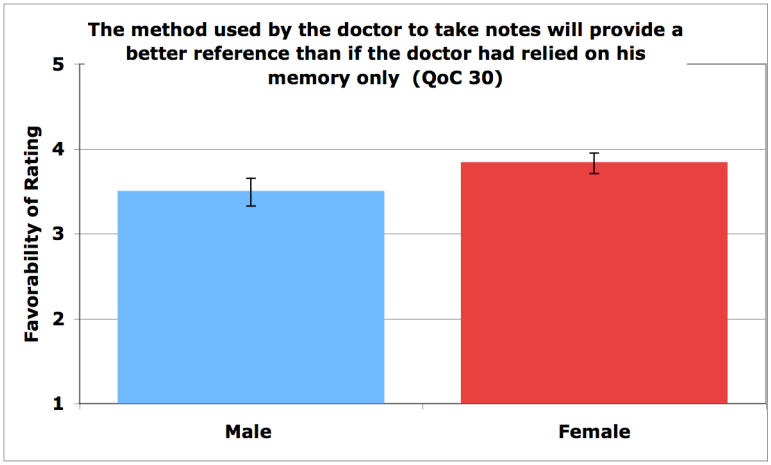


Figure 21. Gender Main Effect of Gender on item relating to the technical quality. Females rated the doctor more favorably than males did. QoC 30: $F(1,135) = 5.264$, $p = 0.024$

Cohort x TechCond Interaction

A MANOVA does not reveal an overall interaction, but subsequent univariate tests show that the way young and older adults responded to items 3 and 40 was moderated by technology condition assignment (see Figures 22 and 23, respectively). For QoC 40 only, there was also a main effect of TechCond (see Figure 23).

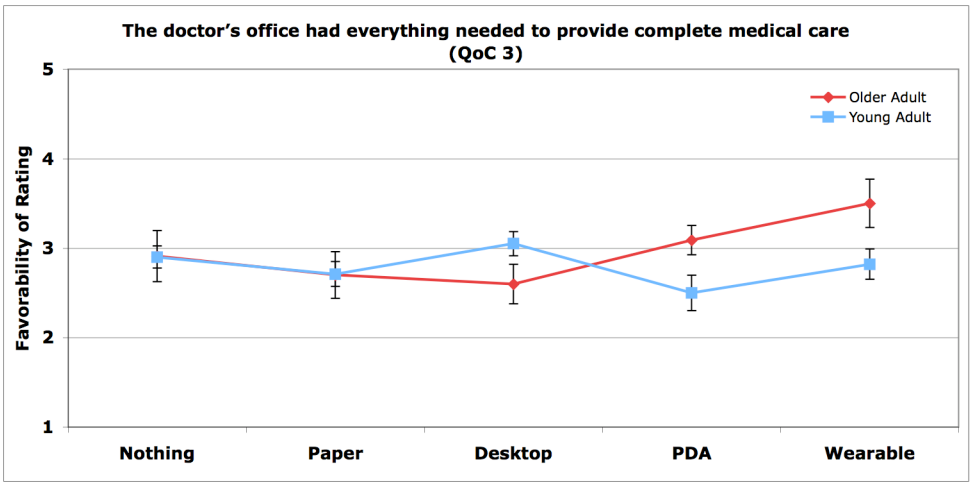


Figure 22. Cohort x TechCond: The rating of each Cohort is moderated by TechCond ($p < 0.001$). Posthocs: *Wearable*: Older Adults rated the *Wearable* higher than Young adults ($p = 0.035$); *Desktop*: Young Adults rated the *Desktop* marginally higher than Older Adults ($p = 0.079$); *PDA*: Older Adults rated the *PDA* marginally higher than Young Adults ($p = 0.055$)

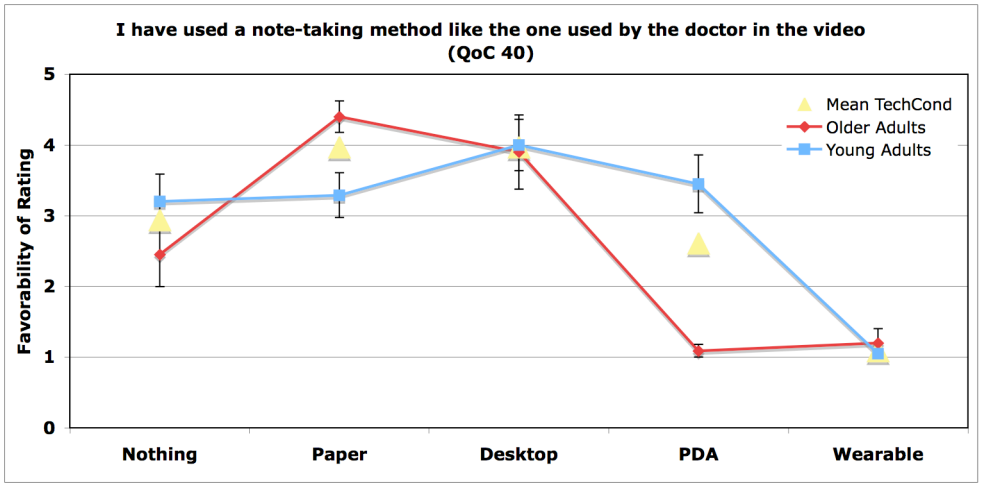


Figure 23. Cohort x TechCond: The rating of each Cohort is moderated by TechCond ($p < 0.001$). TechCond main effect: *PDA*: Young Adults rated the *PDA* as more familiar than older adults ($p < 0.001$); *Paper*: Older Adults rated *Paper* as more familiar than young adults ($p = 0.030$).

Main Effect of TechCond ($p < 0.001$): *Wearable* rated less familiar than all other TechCond ($p < 0.001$). *Paper* rated as more familiar than *PDA* ($p = 0.048$). *Desktop* rated more familiar than *PDA* ($p = 0.004$).

Three-way Interactions

A MANOVA does not reveal any three-way interactions, but subsequent univariate analyses reveals a TechCond x Cohort x Orientation interaction on QoC 39 and the FAMILIARITY subscale (see Figures 24 and 25, respectively), and a TechCond x Gender x Cohort interaction on QoC 27 (see Figure 26).

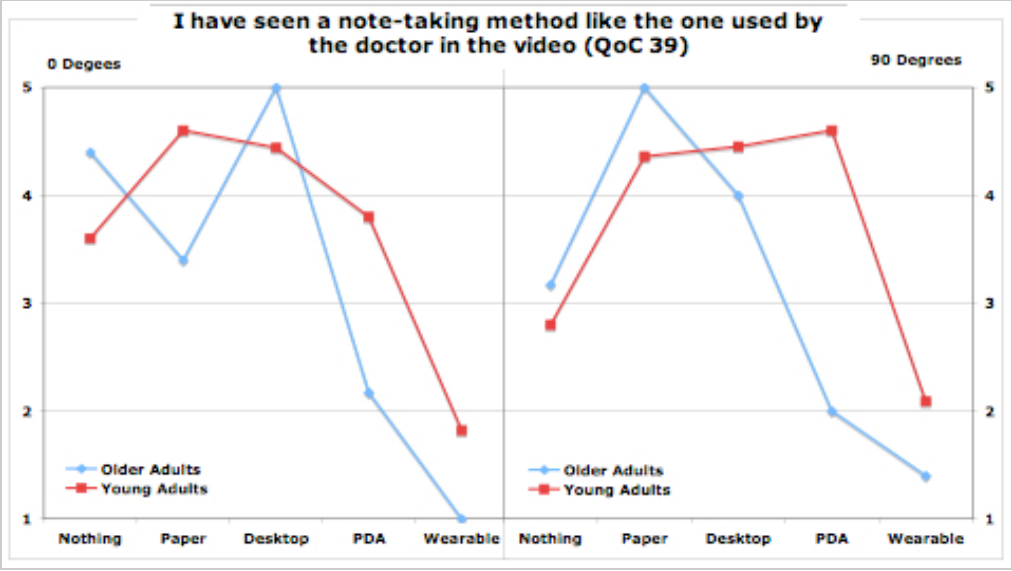


Figure 24. TechCond x Cohort x Orientation interaction. $F(4, 135) = 2.451$, $p = 0.049$.

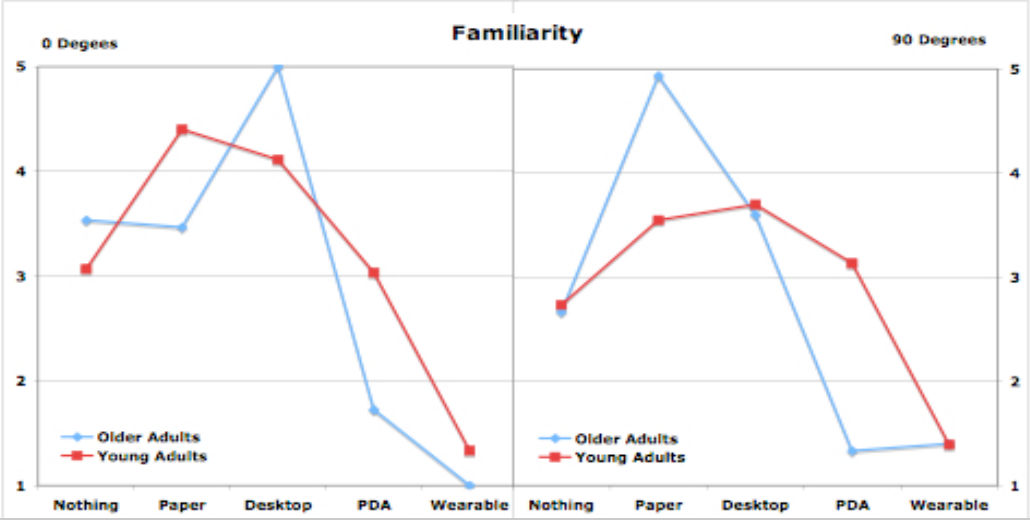


Figure 25. TechCond x Cohort x Orientation interaction. $F(4, 135) = 2.451$, $p = 0.049$.

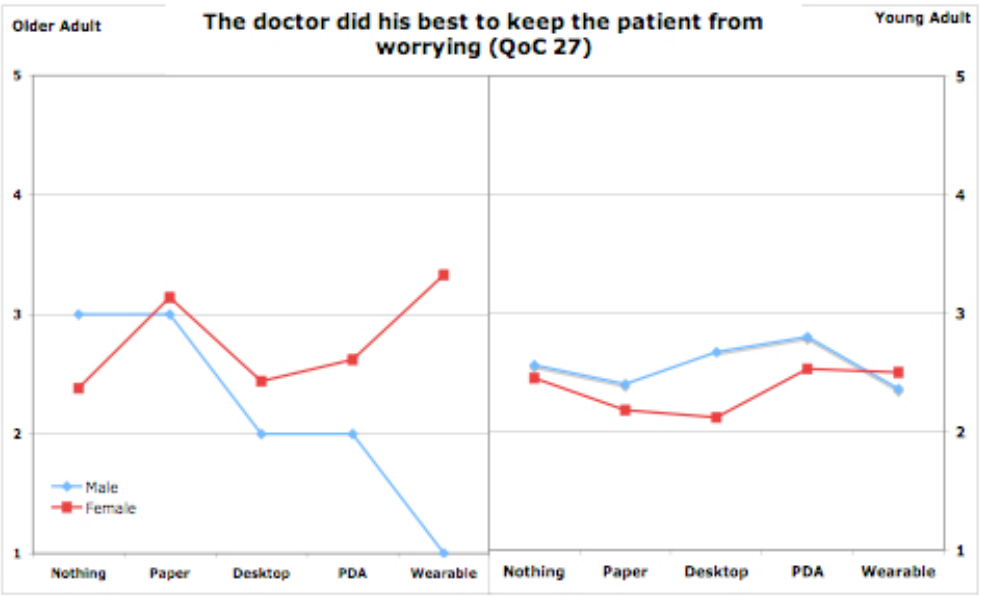


Figure 26. TechCond x Gender x Cohort interaction. $F(2,135) = 3.100$, $p = 0.050$

CHAPTER 10

DISCUSSION

A Novel Methodology

The current study utilizes a novel methodology in which participants view a doctor-patient interaction and immediately report their perception of the quality of care delivered. This has advantages over more traditional methods where participants respond to surveys weeks, months, or in some cases up to a year after their own healthcare experience. Also, this method allows for control across the experience each participant has with the depicted doctor-patient interaction whereas traditional studies in this vein of work include participants who have had a variety of experiences from facility to facility, physician to physician, and even day to day. The methodology used here more fully controls for this experience of healthcare variability than any other.

One question is whether participants felt engaged in the doctor-patient interaction they viewed in the videos. The results and experience from this study provide evidence that they do feel engaged. First, if it were the case that participants felt no personal engagement when viewing the videos, it would be logical to assume that responses to the QoC questionnaire would not statistically deviate from "uncertain", which is not the case for almost all items. Further, it would be expected that participant responses would not be statistically distinct from one technology condition to another, but again this is not what the data analysis shows. Also, there is some evidence in the categorical data that the participants did feel engaged in the doctor-patient interaction.

Although the participants were not instructed to imagine themselves as being the patient per se, the camera angle used does depict the patient's point-of-view, and some participants did spontaneously respond in the first person in the After Video Response Sheet free write section. For example, one participant wrote, "I felt like this doctor was knowledgeable and listened to what I had to say…" Another wrote, "The (wearable) computer was distracting at first, but in a cool way. I realize he was looking in my direction, but not actually at me." In general, most every participant wrote at least a few sentences in this section even though it was optional. Again, this indicates some level of engagement and interest in the doctor-patient interaction viewed.

Support for Hypotheses

Hypothesis 1: Orientation Main Effect - Participants will rate the 0-Degree condition more favorably than the 90-Degree condition on QoC items 26-37.

The one item that showed a significant main effect of Orientation did support Hypothesis 1 as it was in the correct direction and it was a new QoC item. That is, the 0-Degree condition was rated significantly more favorable than the 90-Degree condition (as suggested by the communication literature) and QoC was not included in my previous work, which showed no Orientation main effects. Interestingly, the items assessing eye contact specifically did not reveal a significant main effect of Orientation. For example, it would be expected that responses to QoC 31, "The doctor did not make enough eye contact with the patient," would reveal an Orientation main effect, but did not. Responses to QoC 37, "I wish the doctor would have faced the patient more than he did," provided some support for the main effect of orientation, but only marginally.

Hypothesis 2: **Cohort Main Effect** - There will be a main effect of Cohort.

Hypothesis 2 was supported in that there was an overall main effect of Cohort. Interestingly, older adults tended to rate the doctor less favorably than young adults did on the majority of significant items. Most of these items on which young adults rated the doctor more favorably fell into the TECH subscale (four items), with the remaining falling into the COMM and TIME subscales. The three items on which older adults did rate the doctor more favorably than the younger adults fell into the INTER subscale. It is interesting that older adults rated the doctor more favorably than young adults on items related to interpersonal aspects in light of evidence suggesting that older adults put more emphasis into the "caring" than the "curing" aspects of their own health care (Bastiaens, Van Royen, Pavlicc, Raposo, & Baker, 2007). Perhaps age-related differences in which health care aspects are emphasized when making satisfaction judgments could explain why there were Cohort main effects on some QoC items, but not on reports of WouldGo.

Hypothesis 3: TechCond Main Effect

Hypothesis 3A: The *Wearable* and *Paper* conditions will be rated most favorably overall on the preexisting QoC items 1-27 and 36.

Hypothesis 3A was not supported as there were no significant main effects on QoC items 1-27 and 36, although some items did show marginal effects. Hypothesis 3B was partially supported. On all predicted QoC items (28, 30, 32, 33, and 35) *Nothing* was rated less favorably than *Wearable*. On all but QoC 32, *Nothing* was also rated less favorably than *Desktop*, and at least marginally less than *PDA* (see Figure 16). On QoC 32, *Paper* was also rated less favorably than *Wearable* (see Figure 19).

Hypothesis 3B: *PDA*, and *Wearable* will be rated more favorably than *Nothing* and *Paper* on QoC items 28, 30, 32, 33, and 35.

Each item in Hypothesis 3B concerned the accuracy of documentation. In general, participants rated the device conditions higher than the non-device conditions. This was particularly the case when the doctor used the traditional method of taking 'mental notes' during the medical interview, leaving the patient to assume these would be jotted down subsequent to the exam. These data could be used to posit that today's patients place value in tangible documentation, particularly electronic documentation.

Hypothesis 3C: *Nothing* and *Paper* will be rated more favorably than *Desktop*, *PDA*, and *Wearable* on QoC items 29, 31, and 37.

Hypothesis 3C was also partially supported. For all predicted QoC items (29, 31, and 37), *Nothing* was rated higher (at least marginally so) than all or most of the device conditions (see Figure 17). For QoC 29, which discussed patient distraction with the documentation method used by the doctor, *Paper* was rated more favorably than *PDA* and *Wearable*. Each item within Hypothesis 3C concerned nonverbal communication aspects that could be affected by the documentation method used by the doctor. These data support the idea that technological devices used in the exam room can have a negative effect on the interpersonal and communication aspects of the doctor-patient interaction.

Hypothesis 3D: *Wearable* will be rated less familiar than all other conditions**.**

Hypothesis 3D was supported in that the FAMIL items and subscale showed a main effect of TechCond. Figure 18 illustrates QoC 38 and Figure 23 illustrates QoC 40. QoC 39 and the FAMIL subscale also showed a significant main effect of TechCond, but

these items were further found to be significant in three-way interactions. This finding was expected because not all technology conditions presented in this study are commonly used for exam room documentation. For example, the *PDA* is less commonly used for this purpose and the Wearable is not well known for any purpose, as it is the most novel.

Hypothesis 4: Gender Main Effect - Males will rate the doctor more favorably than females will on QoC items 26-37.

Hypothesis 4 was not supported. Although there was no significant multivariate effect of Gender, a few items did show this main effect. Because Gender main effects were not found on QoC 1-25 in my previous work, it was not predicted that significant results would be found on any of these items here. Further, because the literature indicates that females tend to give lower patient satisfaction scores than males, it was unexpected that the few items that did show Gender main effects would show that females gave more favorable ratings than males.

Hypothesis 5: Cohort x TechCond Interaction - Older adults will rate the doctor more favorably than young adults in the technology conditions that do not use a device (*Nothing*, *Paper*), but will rate the doctor less favorably in the conditions that do utilize a device (*Desktop*, *PDA*, *Wearable*).

Hypothesis 5 was also not supported. Of the QoC items assessing perception of healthcare quality, only QoC 3 revealed a Cohort x TechCond interaction. Young adults did rate the *Desktop* condition marginally more favorably than older adults, but there were no Cohort differences for the non-device conditions. Further, it was unexpected that older adults rated two of the three device conditions more favorably than young adults.

Additional Findings

The TechCond x Cohort x Orientation three-way interaction was not expected (see Figures 24 and 25). There is no apparent reason why the doctor's orientation would

make one TechCond seem more or less familiar than another, or why these results would differ by Cohort. While the *0-Degree* condition might seem more comfortable, and perhaps therefore more familiar, this does not explain why participants would be more likely to report having ever seen the note-taking method before (see Figure 24). The TechCond x Gender x Cohort three-way interaction was also not predicted (see Figure 26). Interestingly, Older and Young Adult males followed the pattern predicted by Hypothesis 5, but females did not. That is to say, that Older adult males rated the non-device conditions more favorably than Young Adult males; but rated the device conditions less favorably than Young Adult males (see Figure 26).

Broader Implications

Though the results do not fit neatly into predictions drawn from either the age-related differences in technology attitudes literature or the age-related differences in patient satisfaction literature, I believe this highlights the importance of the current examination. Here, patient satisfaction was examined with respect to age and the influence of exam room documentation technology for what is, to the best of my knowledge, the first time. The results show that healthcare cannot be effectively tailored or truly patient-centered with what has previously been understood about patient satisfaction in regards to technology implementation. Given that many electronic recording devices are already widely used in healthcare settings and are becoming more common all the time, the need to understand the impact on doctor-patient interactions warrants further attention.

APPENDIX A
SURVEY MATERIALS

A.1 Consent Forms

Consent forms were slightly different for young and older adults to account for difference in reading level requirements, compensation, and location.

A.1.1 Young Adult Consent Form

Consent to be a Research Participant, GA Tech School of Psychology

Project: Doctor-Patient Interaction and Perceived Quality of Care
Principal Investigator: Dr. Bruce N. Walker (404-894-8265)
Experimenters: Julia DeBlasio (770-616-6773)
Location: School of Psychology, Room 215 Coon Building
Duration of Each Session: 1.0 hour **Number of Sessions:** 1
Total Compensation: 1 credit hours
Approximate Number of Participants: 100
Participation limitations: Normal or corrected to normal vision

General: You are being asked volunteer for a collaborative research project.

Study Description: This research is looking at how people perceive the quality of care of an interaction between a doctor and patient in a video of a hospital visit.

Procedures: In one experimental session, you will watch a short video of a doctor and patient interacting. After watching the video you will be asked to evaluate the interaction, specifically the quality of care of the interaction.

Foreseeable Risks or Discomforts: This study is expected to involve no more than minimal risks associated with viewing a short movie and answering questions about the movie.

Confidentiality: The following procedures will be followed to keep your personal information confidential in this study: The data that is collected about you will be kept private to the extent allowed by law. To protect your privacy, your records will be kept under a code number rather than by name. Your records will be kept in locked files and only study staff will be allowed to look at them. Your name and any other fact that might point to you will not appear when results of this study are presented or published. To make sure that this research is being carried out in the proper way, the Georgia Institute of Technology IRB will review study records. Again, your privacy will be protected to the extent allowed by law.

Alternative Credit Option: Participants who choose not to participate in this study may receive the equivalent credit by writing a 2 page paper on a topic related to medical interviews or experimental methods.

Injury/Adverse Reaction: Reports of injury or reaction should be made to Dr. Bruce Walker (404-894-8265). Neither the Georgia Institute of Technology nor the principal investigator has made provision for payment of costs associated with any injury resulting from participation in this study.

Contact Persons: If you have questions about this research, call or write Dr. Bruce Walker at 404-894-8265; School of Psychology, GA Tech, 654 Cherry Street, Atlanta, GA 30332-0170 .

Statement of Rights: You have rights as a research volunteer. Taking part in this study is completely voluntary. If you do not take part, you will have no penalty. You may stop taking part in this study at any time with no penalty. If you have any questions about your rights as a research volunteer, call or write: The Institutional Review Board, Office of Research Compliance, 505 Tenth Street, Campus 0420. Phone: 404-894-6942; Fax: 404-385-2081.

Signatures: A copy of this form will be given to you. If you sign below, it means that you have read the information given in this consent form, and you would like to be a volunteer in this study.

Subject's Signature Date Experimenter Date

A.1.2 Older Adult Consent Form

Consent to be a Research Participant, GA Tech School of Psychology

Project: Doctor-Patient Interaction and Perceived Quality of Care
Principal Investigator: Dr. Bruce N. Walker (404-894-8265
Experimenters: Julia DeBlasio (770-616-6773
Location: Life Enrichment Services (Mac Love Center)
Duration of Each Session: 45-60 Minutes **Number of Sessions:** 1
Total Compensation: $12.00
Approximate Number of Participants: 100
Participation limitations: Normal or corrected to normal vision

General: You are being asked to help in a research project.
Study Description: We want to understand how people feel about the care a doctor gives to his patients.
Procedures: First, you will watch a short video of a doctor and patient talking. After watching the video, you will be asked about the level of care given during the visit.
Foreseeable Risks or Discomforts: This study should only involve minimal risks. The risks should be the same as watching a short movie and answering questions about the movie.
Confidentiality: Your personal information will be kept private. The data you provide will be kept private to the level allowed by law. To protect your privacy, your records will be labeled as a code number rather than as a name. Your records will be kept in locked files and only study staff will be allowed to look at them. Your name and other information will not appear when this study is shown or published. To make sure that this research is carried out in the proper way, the Georgia Institute of Technology IRB will review study records. Again, your privacy will be protected to the degree allowed by law.
Injury/Adverse Reaction: If you get hurt, then you should call Bruce Walker. His phone number is 404-894-8265. Neither the Georgia Institute of Technology nor the principal investigator has savings set aside in the case of injury resulting from participation in this study.
Contact Persons: If you have questions about this project, call or write Dr. Bruce Walker at 404-894-8265; School of Psychology, GA Tech, 654 Cherry Street, Atlanta, GA 30332-0170 .
Statement of Rights: You have rights as a research volunteer. Taking part in this study is completely your decision. If you do not take part, you will have no penalty. You may stop taking part in this study at any time with no penalty. If you have any questions about your rights as a research volunteer, then you can call or write:
The Institutional Review Board
Office of Research Compliance
505 Tenth Street
Atlanta, GA 30332-0420
Phone: 404-894-6942 Fax: 404-385-2081.
Signatures: A copy of this form will be given to you. If you sign below, it means that you have read the information given in this consent form, and you would like to be a volunteer in this study.

Subject's Signature Date Experimenter Date

A.2 Background Questionnaires

The Background Questionnaire was slightly different for young and older adults due to the fact that young adults have a “major” as opposed to a “career”.

A.2.1 Young Adult Background Questionnaire

Background Questionnaire

Participant #: _____

Age: _____

Gender: Male _____Female _____

To your knowledge, do you have normal or corrected-to-normal vision? Yes __ No __

To your knowledge, do you have normal or corrected-to-normal hearing? Yes __ No __

What is your major? _____

Are you in good health? Yes __ No __

Has there been any change in your general health within the past year? (circle one answer)

1	2	3	4	5
much worse	somewhat worse	about the same	somewhat better	much better

How many times have you gone to the doctor's office in the past year? (circle one answer)

0 times 1-2 times 3-4 times 5 or more times

A.2.2 Older Adult Background Questionnaire

Background Questionnaire

Participant #: _____

Age: _____

Gender: Male _____Female _____

To your knowledge, do you have normal or corrected-to-normal vision? Yes __ No __

To your knowledge, do you have normal or corrected-to-normal hearing? Yes __ No __

What is/was your profession? _____

Are you in good health? Yes __ No __

Has there been any change in your general health within the past year? (circle one answer)

1	2	3	4	5
much worse	somewhat worse	about the same	somewhat better	much better

How many times have you gone to the doctor's office in the past year? (circle one answer)

0 times 1-2 times 3-4 times 5 or more times

A.3 General Abilities Tasks

A.3.1 Shipley's Vocabulary Task

Participant # _____

SHIPLEY INSTITUTE OF LIVING SCALE

Instructions:

In the test below, the first word in each line is printed in capital letters. Opposite it are four other words. Circle the *one word* which means the *same thing*, or most nearly the same thing, as the first word. If you don't know, guess. Be sure to circle the *one word* in each line that means the same thing as the first word.

EXAMPLE:

LARGE	red	(big)	silent	wet

PLEASE DO NOT TURN THE PAGE UNTIL INSTRUCTED TO DO SO.

Participant # _____

1)	TALK	draw	eat	speak	sleep
2)	PERMIT	allow	sew	cut	drive
3)	PARDON	forgive	pound	divide	tell
4)	COUCH	pin	eraser	sofa	glass
5)	REMEMBER	swim	recall	number	defy
6)	TUMBLE	drink	dress	fall	think
7)	HIDEOUS	silvery	tilted	young	dreadful
8)	CORDIAL	swift	muddy	leafy	hearty
9)	EVIDENT	green	obvious	skeptical	afraid
10)	IMPOSTOR	conductor	officer	book	pretender
11)	MERIT	deserve	distrust	fight	separate
12)	FASCINATE	welcome	fix	stir	enchant
13)	INDICATE	defy	excite	signify	bicker
14)	IGNORANT	red	sharp	uninformed	precise
15)	FORTIFY	submerge	strengthen	vent	deaden
16)	RENOWN	length	head	fame	loyalty
17)	NARRATE	yield	buy	associate	tell
18)	MASSIVE	bright	large	speedy	low
19)	HILARITY	laughter	speed	grace	malice
20)	SMIRCHED	stolen	pointed	remade	soiled

Participant # _____

21)	SQUANDER	tease	belittle	cut	waste
22)	CAPTION	drum	ballast	heading	ape
23)	FACILITATE	help	turn	strip	bewilder
24)	JOCOSE	humorous	paltry	fervid	plain
25)	APPRISE	reduce	strew	inform	delight
26)	RUE	eat	lament	dominate	cure
27)	DENIZEN	senator	inhabitant	fish	atom
28)	DIVEST	dispossess	intrude	rally	pledge
29)	AMULET	charm	orphan	dingo	pond
30)	INEXORABLE	untidy	involatile	rigid	sparse
31)	SERRATED	dried	notched	armed	blunt
32)	LISSOM	moldy	loose	supple	convex
33)	MOLLIFY	mitigate	direct	pertain	abuse
34)	PLAGIARIZE	appropriate	intend	revoke	maintain
35)	ORIFICE	brush	hole	building	lute
36)	QUERULOUS	maniacal	curious	devout	complaining
37)	PARIAH	outcast	priest	lentil	locker
38)	ABET	waken	ensue	incite	placate
39)	TEMERITY	rashness	timidity	desire	kindness
40)	PRISTINE	vain	sound	first	level

A.3.2 The Digit Symbol Substitution Task

Participant # _____

Digit-Symbol Substitution

In this task you will be asked to write symbols that correspond to the numbers 1 through 9. The numbers and their symbols are:

1	2	3	4	5	6	7	8	9
–	⊥	⊐	∟	⊔	○	∧	X	=

When you turn the page, there will be rows of numbers. Each number has an empty box below it. Your task is to write the corresponding symbol below each number. Please try the following:

3	9	5	8	1	7	2	4

The numbers and their corresponding symbols will be given to you again on the next page. You will have 90 seconds to write as many symbols as possible.

Please start with the top row and work from left to right, without skipping any boxes.

Please do not turn the page until instructed to do so.

1	2	3	4	5	6	7	8	9
−	⊥	⊐	∟	⊔	○	∧	X	=

2	1	3	7	2	4	8	1	5	4	2	1	3	2	1	4	2	3	5	2	3	1	4	6	3

1	5	4	2	7	6	3	5	7	2	8	5	4	6	3	7	2	8	1	9	5	8	4	7	3

6	2	5	1	9	2	8	3	7	4	6	5	9	4	8	3	7	2	6	1	5	4	6	3	7

9	2	8	1	7	9	4	6	8	5	9	7	1	8	5	2	9	4	8	6	3	7	9	8	6

STOP! DO NOT TURN THE PAGE UNTIL ASKED TO DO SO.

Participant # _____

THIS PAGE IS LEFT BLANK INTENTIONALLY

Participant # _____

Recall of Digit-Symbol Key

Without turning back to the previous pages, try to fill in the blanks.

1	2	3	4	5	6	7	8	9

Please do not turn the page until instructed to do so.

A.3.3 Reverse Digit Span Task

Participant # _____

REVERSE DIGIT SPAN

In this test you will be asked to remember digits presented orally and then to write them down in reverse order. After you hear each set of digits write your answer on the answer sheet provided. Please wait until all the digits are presented before writing your answer.

EXAMPLE:

Answer Sheet

(You will hear.)	(You should write:)
5 – 8 – 2	2 – 8 – 5
4 – 2 – 7 – 3 – 1	1 – 3 – 7 – 2 – 4

Participant # _____

Answer Sheet

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____

A.4 After Video Response Sheet

Participant # _____

After Video Response Sheet

Would you go to this doctor if you had a medical problem?

No	Probably Not	Uncertain	Probably	Yes
1	2	3	4	5

Comments about the video or the study in general:

A.5 Quality of Care Questionnaires

The wording on the Quality of Care questionnaires varied slightly between the *Nothing*, Paper, and Device (*Desktop*, *PDA*, *Wearable*) conditions.

A.5.1 Quality of Care Questionnaire (*Nothing*)

Instructions

After watching the video, please answer these questions about the medical care you just observed during the interview.

How strongly do you AGREE or DISAGREE with each of the following statements?

(Circle One Number on Each Line)

QUESTIONS:

1. The doctor needed to be more thorough in questioning the patient

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

2. The medical care the patient received was satisfactory

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

3. The doctor's office had everything needed to provide complete medical care

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

4. The doctor should have given the patient more respect

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

5. The medical care that the patient received was just about perfect

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

6. During the medical visit, the patient was allowed to say everything important

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

7. The doctor had a genuine interest in the patient as a person

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

8. Sometimes the doctor used medical terms without explaining what they meant

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

9. There are things about the medical care that needed to be improved

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

10. The doctor that treated the patient knows about the latest medical developments

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

11. Sometimes the doctor made the patient appear foolish

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

12. The doctor acted too businesslike and impersonal toward the patient

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

13. The doctor never exposed the patient to unnecessary risk

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

14. There were some things about the medical care the patient received that could be better

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

15. The doctor treated the patient in a very friendly and courteous manner

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

16. The doctor sometimes hurried too much when he treated the patient

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

17. The doctor lacked experience with the patient's medical problem

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

18. The doctor sometimes ignored what the patient told him

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

19. When the patient received medical care, the doctor should have paid more attention to his privacy

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

20. All things considered, the medical care the patient received was excellent

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

21. The doctor listened carefully to what the patient had to say

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

22. I have some doubts about the ability of the doctor who treated the patient

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

23. The doctor spent plenty of time with the patient

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

24. I am dissatisfied with some things about the medical care that the patient received

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree

1	2	3	4	5

25. The doctor was very competent and well-trained

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

26. The doctor was careful to check everything when interviewing the patient

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

27. The doctor did his best to keep the patient from worrying

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

28. The doctor will be able to update the patient's records accurately

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

29. The method used by the doctor to take notes was distracting

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

30. Notes recorded during the interview would have provided a better reference than the doctor relying on his memory only

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

31. The doctor did not make enough eye contact with the patient

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

32. The doctor had access to the latest medical developments

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

33. The method used by the doctor to take notes provided him a powerful medical tool

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

34. The method used by the doctor to take notes made me trust the doctor less

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

35. I preferred that the doctor took notes after leaving the exam room instead of during the interview

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

36. The patient should follow the recommendations made to him by this doctor

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

37. I wish the doctor would have faced the patient more than he did

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

38. My doctor has used a note-taking method like the one the doctor in the video used

Yes		Uncertain		No
1	2	3	4	5

39. I have seen a note-taking method like the one used by the doctor in the video

Yes		Uncertain		No
1	2	3	4	5

40. I have used a note-taking method like the one used by the doctor in the video

Yes		Uncertain		No
1	2	3	4	5

A.5.2 Quality of Care Questionnaire (Paper)

Instructions

After watching the video, please answer these questions about the medical care you just observed during the interview.

How strongly do you AGREE or DISAGREE with each of the following statements?

(Circle One Number on Each Line)

QUESTIONS:

1. The doctor needed to be more thorough in questioning the patient

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

2. The medical care the patient received was satisfactory

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

3. The doctor's office had everything needed to provide complete medical care

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

5. The doctor should have given the patient more respect

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

5. The medical care that the patient received was just about perfect

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

6. During the medical visit, the patient was allowed to say everything important

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

7. The doctor had a genuine interest in the patient as a person

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree

1 2 3 4 5

8. Sometimes the doctor used medical terms without explaining what they meant

Strongly Agree Agree Uncertain Disagree Strongly Disagree

1 2 3 4 5

9. There are things about the medical care that needed to be improved

Strongly Agree Agree Uncertain Disagree Strongly Disagree

1 2 3 4 5

10. The doctor that treated the patient knows about the latest medical developments

Strongly Agree Agree Uncertain Disagree Strongly Disagree

1 2 3 4 5

11. Sometimes the doctor made the patient appear foolish

Strongly Agree Agree Uncertain Disagree Strongly Disagree

1 2 3 4 5

12. The doctor acted too businesslike and impersonal toward the patient

Strongly Agree Agree Uncertain Disagree Strongly Disagree

1 2 3 4 5

13. The doctor never exposed the patient to unnecessary risk

Strongly Agree Agree Uncertain Disagree Strongly Disagree

1 2 3 4 5

14. There were some things about the medical care the patient received that could be better

Strongly Agree Agree Uncertain Disagree Strongly Disagree

1 2 3 4 5

15. The doctor treated the patient in a very friendly and courteous manner

Strongly Agree Agree Uncertain Disagree Strongly Disagree

1 2 3 4 5

16. The doctor sometimes hurried too much when he treated the patient

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

17. The doctor lacked experience with the patient's medical problem

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

18. The doctor sometimes ignored what the patient told him

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

19. When the patient received medical care, the doctor should have paid more attention to his privacy

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

20. All things considered, the medical care the patient received was excellent

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

21. The doctor listened carefully to what the patient had to say

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

22. I have some doubts about the ability of the doctor who treated the patient

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

23. The doctor spent plenty of time with the patient

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

24. I am dissatisfied with some things about the medical care that the patient received

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree

1	2	3	4	5

25. The doctor was very competent and well-trained

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

26. The doctor was careful to check everything when interviewing the patient

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

27. The doctor did his best to keep the patient from worrying

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

28. The doctor will be able to update the patient's records accurately

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

29. The method used by the doctor to take notes was distracting

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

30. The method used by the doctor to take notes will provide a better reference than if the doctor had relied on his memory only

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

31. The doctor did not make enough eye contact with the patient

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

32. The doctor had access to the latest medical developments

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

33. The method used by the doctor to take notes provided him a powerful medical tool

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

34. The method used by the doctor to take notes made me trust the doctor less

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

35. I would prefer if the doctor took notes after leaving the exam room instead of during the interview

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

36. The patient should follow the recommendations made to him by this doctor

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

37. I wish the doctor would have faced the patient more than he did

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

38. My doctor has used a note-taking method like the one the doctor in the video used

Yes		Uncertain		No
1	2	3	4	5

39. I have seen a note-taking method like the one used by the doctor in the video

Yes		Uncertain		No
1	2	3	4	5

40. I have used a note-taking method like the one used by the doctor in the video

Yes		Uncertain		No
1	2	3	4	5

A.5.3 Quality of Care Questionnaire (Devices: Desktop, PDA, Wearable)

Instructions

After watching the video, please answer these questions about the medical care you just observed during the interview.

How strongly do you AGREE or DISAGREE with each of the following statements?

(Circle One Number on Each Line)

QUESTIONS:

1. The doctor needed to be more thorough in questioning the patient

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

2. The medical care the patient received was satisfactory

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

3. The doctor's office had everything needed to provide complete medical care

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

6. The doctor should have given the patient more respect

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

5. The medical care that the patient received was just about perfect

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

6. During the medical visit, the patient was allowed to say everything important

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

7. The doctor had a genuine interest in the patient as a person

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree

1 2 3 4 5

8. Sometimes the doctor used medical terms without explaining what they meant

Strongly Agree Agree Uncertain Disagree Strongly Disagree

1 2 3 4 5

9. There are things about the medical care that needed to be improved

Strongly Agree Agree Uncertain Disagree Strongly Disagree

1 2 3 4 5

10. The doctor that treated the patient knows about the latest medical developments

Strongly Agree Agree Uncertain Disagree Strongly Disagree

1 2 3 4 5

11. Sometimes the doctor made the patient appear foolish

Strongly Agree Agree Uncertain Disagree Strongly Disagree

1 2 3 4 5

12. The doctor acted too businesslike and impersonal toward the patient

Strongly Agree Agree Uncertain Disagree Strongly Disagree

1 2 3 4 5

13. The doctor never exposed the patient to unnecessary risk

Strongly Agree Agree Uncertain Disagree Strongly Disagree

1 2 3 4 5

14. There were some things about the medical care the patient received that could be better

Strongly Agree Agree Uncertain Disagree Strongly Disagree

1 2 3 4 5

15. The doctor treated the patient in a very friendly and courteous manner

Strongly Agree Agree Uncertain Disagree Strongly Disagree

1 2 3 4 5

16. The doctor sometimes hurried too much when he treated the patient

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

17. The doctor lacked experience with the patient's medical problem

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

18. The doctor sometimes ignored what the patient told him

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

19. When the patient received medical care, the doctor should have paid more attention to his privacy

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

20. All things considered, the medical care the patient received was excellent

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

21. The doctor listened carefully to what the patient had to say

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

22. I have some doubts about the ability of the doctor who treated the patient

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

23. The doctor spent plenty of time with the patient

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

24. I am dissatisfied with some things about the medical care that the patient received

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree

1	2	3	4	5

25. The doctor was very competent and well-trained

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

26. The doctor was careful to check everything when interviewing the patient

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

27. The doctor did his best to keep the patient from worrying

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

28. The doctor will be able to update the patient's records accurately

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

29. The method used by the doctor to take notes was distracting

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

30. The method used by the doctor to take notes will provide a better reference than if the doctor had relied on his memory only

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

31. The doctor did not make enough eye contact with the patient

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

32. The doctor had access to the latest medical developments

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

33. The technology used by the doctor provided him a powerful medical tool

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

34. The technology used by the doctor made me trust the doctor less

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

35. I would prefer if the doctor took notes after leaving the exam room instead of during the interview

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

36. The patient should follow the recommendations made to him by this doctor

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

37. I wish the doctor would have faced the patient more than he did

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	2	3	4	5

38. My doctor has used a device like the one the doctor in the video used

Yes		Uncertain		No
1	2	3	4	5

39. I have seen a device like the one used by the doctor in the video

Yes		Uncertain		No
1	2	3	4	5

40. I have used a device like the one used by the doctor in the video

Yes		Uncertain		No
1	2	3	4	5

A.6 Technology Use Survey

Technology and Computer Experience Questionnaire

The purpose of this questionnaire is to assess your familiarity and experience with technology. Please answer all questions by placing a check mark at the appropriate response.

1. Please check all of the following devices that you have used for any purpose.

	Not sure what it is	In the past, not currently	Never	Once in a while	Most of the time	Always
a Answering Machine						
b Cellular Phone						
c Compact Disk Player						
d Copy Machine						
e Cruise Control (in your car)						
f Fax Machine						
g Microwave Oven						
h Wearable Computer						
i Phone-in Banking (press "1" for "yes")						
j Personal Computer						
k Video Camera						
l Voice Mail						
m Automatic Teller Machines (ATM)						
n Home Securities Systems						
o Pay at the Pump Systems						
p Clock Radio/Alarm						
q Computer/ Video Games						
r Digital Photography (camera, camcorder)						
s Personal Digital Assistant (PDA)						

2. How often do you communicate with other people (e.g., family members, friends, doctors, customer service representatives)?

- ☐ 1 Daily
- ☐ 2 Weekly
- ☐ 3 Monthly
- ☐ 4 Yearly
- ☐ 5 Never

3. Within the last year, which of the following methods have you **used** for communication?

	Not sure what it is	In the past, not currently	Never	Used Once	Most of the time	Used Frequently
a Face-to-face (in person)						
b Answering machine						
c Cell phone						
d Fax machine						
e Internet (e.g. e-mail, chat room, videoconferencing)						
f Telephone (land line)						
g Videophone						
h Handwritten (e.g., postal servic e)						

4. Please check which of the following items you own.

- ☐a Answering Machine
- ☐b Cellular Phone
- ☐c Compact Disk Player
- ☐d Cruise Control (in your car)
- ☐e Fax Machine
- ☐f Microwave Oven
- ☐g Video Cassette Recorder
- ☐h Video Camera
- ☐i Clock Radio/Alarm
- ☐j Home Computer
- ☐k Personal Digital Assistant
- ☐l Wearable Computer
- ☐m ------ *None of the Above* --------

5. How often do you use customer service functions (e.g., technical support, product assistance, reservations)?

- ☐ 1 Daily
- ☐ 2 Weekly
- ☐ 3 Monthly
- ☐ 4 Yearly
- ☐ 5 Never

6. Which of the following have you **used** for customer service (e.g., technical support, product assistance, reservations)?

	Not sure what it is	In the past, not currently	Never	Used Once	Most of the time	Used Frequently
a Automated telephone menu system						
b CD/DVD						
c E-mail						
d Fax machine						
e Internet (e.g., on-line manuals, interactive support, web site)						
f Person on the telephone						

7. How often do you engage in healthcare related activities for yourself or others (e.g., going to see a doctor, checking blood pressure, finding information about a disease or medication)?

- ☐ 1 Daily
- ☐ 2 Weekly
- ☐ 3 Monthly
- ☐ 4 Yearly
- ☐ 5 Never

8. Within the last year, which of the following have you **used** for healthcare related activities for yourself or others?

	Not sure what it is	In the past, not currently	Never	Used Once	Most of the time	Used Frequently
a Automated telephone menu system						
b Health information searching on the Internet						
c Internet communication (e.g., e-mail, computer support groups)						
d Medical-related Internet purchasing						
e Person on the telephone						
f Telemedicine (e.g., videoconferencing with doctors or nurses)						

9. How often do you use healthcare devices at home for yourself or others (e.g., glucose monitor, blood pressure monitor)?

- ☐ 1 Daily
- ☐ 2 Weekly
- ☐ 3 Monthly
- ☐ 4 Yearly
- ☐ 5 Never

10. Within the last year, which of the following healthcare devices have you **used** in your home?

	Not sure what it is	In the past, not currently	Never	Used Once	Most of the time	Used Frequently
a Blood pressure measurement device						
b Digital thermometer						
c Electronic dental hygiene system (e.g., electric toothbrush, Waterpik)						
d Emergency call system (e.g., Lifeline)						
e Heating pads						
f Infusion pump						
gMonitoring device (e.g., glucose, apnea, cardiac)						
h Nebulizers						
i Oxygen equipment						

11. How much more training would you like to have in the use of technology?

- ☐ 1 None
- ☐ 2 A litte
- ☐ 3 Moderate training
- ☐ 4 A lot

12. For each of activities listed in the table, please indicate how important technology is to the performance of the activity.

	Not sure what it is	Not Important	Somewhat Important	Important	Very Important
a Communication activities					
b Customer service activities					
c Financial transaction activities					
d Healthcare related activities for yourself or others					
e Home activities					
f Learning/education/ self-help activities					
g Leisure/hobby/ entertainment activities					
h Shopping activitie s					
i Transportation activities					
j Use of healthcare devices in your home					
k Work activities					

13. Have you had any experience with computers?

☐ Yes

☐ No

If you answered <u>No</u>, please stop here.

14. Of the input devices listed below, please indicate **<u>ALL</u>** devices with which you have had experience (check all that apply).

	Not sure what it is	In the past, not currently	Never	Used Once	Most of the time	Used Frequently
a Keyboard						
b Mouse						
c Light-pen						
d Trackball						
e Touch Screen						
f Voice Input System						
g Joystic k						

15. For each basic computer operation listed below, please indicate how much experience you have had with the operation in the past year.

	Not sure what it is	In the past, not currently	Never	Used Once	Most of the time	Used Frequently
a Delete a file						
b Insert a disk/CD/DVD						
c Install software						
d Open a file						
e Save a file						
f Set printer options						
g Set monitor options						
h Transfer files						
i Use a printer						
j Use cut-and-past operations						

16. Indicate the total length of time you have used computers.

☐1 Less than 6 months
☐2 6 months but less than 1 year
☐3 1 year but less than 3 years
☐4 3 years but less than 5 years
☐5 At least 5 years

17. In the past, what was the highest frequency of your computer use over any 3-month period?

☐1 Once every few months
☐2 Every month
☐3 Once per week
☐4 Several days per week
☐5 Daily, but infrequently during the day
☐6 Daily, frequently during the day
☐7 Daily, most of the day

18. Have you used a computer in the last three months?

☐ Yes ☐ No

If **Yes**, how frequently?

☐1 Less than one hour a week
☐2 1 hour but less than 5 hours a week
☐3 5 hours but less than 10 hours a week
☐4 10 hours but less than 15 hours a week
☐5 At least 15 hours a week

19. For each item listed below, please indicate how much experience you have had with the item in the past year.

	Not sure what it is	In the past, not currently	Never	Used Once	Most of the time	Used Frequently
a Apple (Macintosh)						
b CD/DVD creation software						
c Computer graphics (e.g., Photoshop, Harvard Graphics, AutoCAD)						
d Conferencing software						
e Database management (e.g., Access, Filemaker, Lotus 123)						
f E-mail						
g Home computer network (e.g., wire or wireless)						
h Instant messaging						
i Internet phone						
j Presentation software (e.g., PowerPoint, Freelance						
k Programming package (e.g., Basic, C++, Fortran, Java)						
l Spreadsheet (e.g., Excel, Quattro Pro)						
m Statistical package (e.g., SPSS, SAS)						
n UNIX/LINUX operating system						
o Web design software (e.g., Java, HTML)						
p Windows operating system						
q Word processing (e.g., Microsoft Word, WordPerfect)						

20. What percentage of your computer use is done with the following types of operating systems?:
(Please answer with percentage values)

_____% MS Windows (all versions)
_____% Mac OS (all versions)
_____% UNIX/Linux (and related)
_____% all others (Please specify:_____)
=====
100 % Total

21. How did it make you feel to watch the doctor in the video using technology during the medical interview seen in the video?

22. Do you feel the technology used by the doctor in the video could benefit the patient? Why or why not?

This survey is based on a questionnaire provided by the CREATE Group:

Czaja, S. J., Charness, N., Fisk, A. D., Rogers, W., & Sharit, J. (2001). The center for research and education on aging and technology enhancement: A program for enhancing technology for older adults. Gerontology, 1, 50-59.

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